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Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean: Annex to Volume 1 - Individual Governance Architecture Assessment for Fifty Transboundary Large Marine Ecosystems

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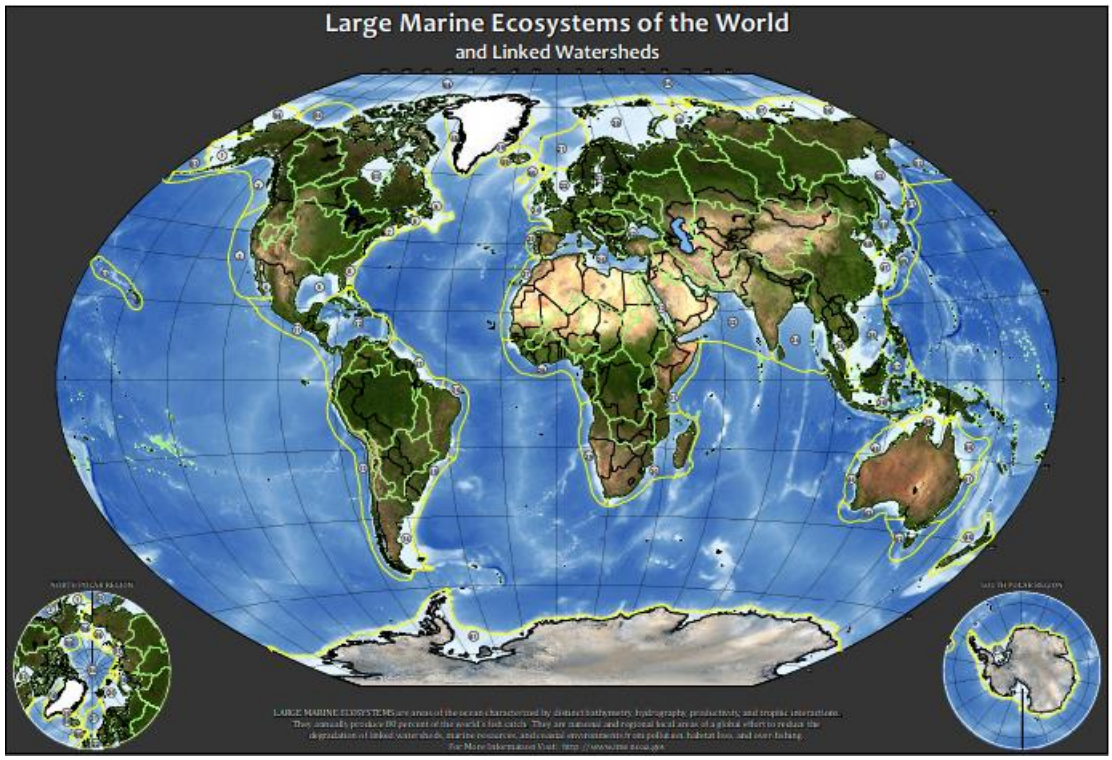

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Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean: Annex to Volume 1 - Individual Governance Architecture Assessment for Fifty Transboundary Large Marine Ecosystems

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Introduction

This Annex is an accompaniment to the document published by the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) entitled *Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean, Volume 1: Transboundary Large Marine Ecosystems*, Technical Series 119 (2015). That volume is one of the outputs of the Large Marine Ecosystem component of the Global Environment Facility (GEF) Transboundary Waters Assessment Programme (TWAP)(2013-2015). TWAP conducted indicator-based assessments for transboundary water systems in five categories: aquifers, rivers, lakes, Large Marine Ecosystems (LMEs) and Open Oceans. These included assessment of governance arrangements and overall architecture for transboundary systems.

In the course of preparing this work, a separate assessment was carried out for each transboundary LME, that is, shared by two or more coastal states. The results of these individual LME assessments are provided in this Annex in alphabetical order. For each LME, the assessment describes:

- The LME as a system to be governed
- The transboundary issues as identified in published documentation
- The governance arrangements addressing each transboundary issue, including the spatial overlap among the different arrangements and the level of country participation in each arrangement
- The assessment of the arrangements in terms of level of completeness of the policy cycle in place for each arrangement
- The assessment of transboundary integration of arrangements within systems
- A concluding paragraph identifying both the assessed scores for the three governance architecture indicators of completeness, integration and engagement and a level of risk associated with each of the scores obtained for each indicator.

This volume is intended to be a resource for LME practitioners and others interested in governance architecture of LMEs. Each LME chapter can be cut out and updated for use in furthering governance assessment of LMEs.

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Assessment of transboundary governance architecture for the Agulhas-Somali Current LME

1 The system to be governed

The system is the Agulhas-Somali Current LME. It was decided that these two LMEs should be treated together. During project development the review of oceanographic information led to the conclusion that the ecosystem extended beyond the boundaries of the two LMEs as previously defined. Therefore, the Aghulas-Somali Current LME Project area was expanded to include offshore areas as described in the TDA (ASCLME 2012a). The initial area and the expanded area include the marine waters of the countries shown in Table 1, as well as a significant area of High Seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapters II-4 and II-5), so a review is not provided here. This assessment is also informed by the governance assessment, TDA, PRODOC and draft SAP (ASCLME 2011, 2012a, 2012b).

Table 1. Percentage of Agulhas-Somali Current LME area taken up by the EEZ of each country and the High Seas for the combined Aghulas-Somali Current LMEs (area = 3,457,500 km^2) and the expanded Aghulas-Somali Current LME (area = 14,875,940 km^2)

Country	Percent of area	
	Combined LMEs	Expanded LME
Comoro Islands	4.7	1.1
France (Bassas da India)	3.5	0.4
France (Glorioso Islands)	1.2	0.3
France (Ile Europe)	3.6	0.8
France (Juan de Nova I.)	1.8	0.4
France (Mayotte)	1.8	0.4
France (Reunion)		2.1
Kenya	3.1	0.8
Madagascar	23.9	8.1
Mauritius		8.6
Mozambique	16.4	3.8
Seychelles	1.3	9.0
Somalia	13.3	4.7
South Africa	14.3	4.7
Tanzania	6.9	1.6
High Seas	4.1	51.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA (ASCLME 2012 b). Fifty transboundary issues were identified and grouped under four Main Areas of Concern (MACs) as outlined below:

- Water quality degradation
  - Alteration of natural river flow and changes in freshwater input and sediment load

- Degradation of ground and surface water quality
- Degradation of coastal and marine water quality[1]

- Habitat and community modification
  - Shoreline change, due to modification, land reclamation and coastal erosion
  - Disturbance, damage and loss of coastal, watershed and upland habitats[2]
  - Disturbance, damage and loss of subtidal benthic habitats[3]
  - Disturbance, damage and degradation of pelagic habitats[4]
  - Increase in the occurrence of harmful or toxic algal blooms (HABs)
  - Introduction of exotic non-native species, invasives and nuisance species
- Declines in living marine resources
  - Declines in populations of focal species[5]
  - Declines in populations of commercial fish stocks[6]
  - Declines in populations of commercial invertebrates[7]

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

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[1] Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources, nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources, chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources, suspended solids in coastal waters due to human activities on land and in the coastal zone, solid wastes / marine debris (plastics etc.) from shipping and land-based-sources, oil spills (drilling, exploitation, transport, processing, storage, shipping).

[2] Upland/watershed habitats (>10 m elevation), coastal forest habitats, coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation), wetland habitats, estuarine habitats, mangrove habitats,

[3] Coral reef habitats, seagrass habitats, macroalgal habitats, soft sediment habitats, deep water habitats (including sea mounts.

[4] Nearshore <30 m, neritic 30-200m and oceanic >200m depth.

[5] Marine mammals, cetaceans, seabirds, turtles

[6] Sharks and rays, arge pelagic, small pelagics, deep water demersals, reef and demersal fish

[7] Molluscs (bivalves, gastropods), abalone, cephalopods, sea cucumbers, sea urchins, prawns and shrimp, lobsters, crayfish, crabs.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

- Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
- Indian Ocean Tuna Commission (IOTC)
- South Indian Ocean Fisheries Agreement (SIOFA)
- Southwest Indian Ocean Fisheries Commission (SWIOFC)
- Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the West Indian Ocean (Nairobi Convention)
    - Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region (PA/Biodiversity Protocol)
    - Protocol Concerning Co-operation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region (Emergency Protocol)
    - Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities (LBS Protocol).
- African Centre for Capacity Building in Ocean Governance (AfriCOG)
- Southern Indian Ocean Deepsea Fisheries Association (SIODFA)
- Indian Ocean MOU on Port State Control (IMO IO PSC MOU)
- Western Indian Ocean Marine Science Association (WIOMSA)
- Coastal Ocean Research and Development in the Indian Ocean (CORDIO)
- Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
- A Strategic Action Programme for Sustainable Management of the Western Indian Ocean Large Marine Ecosystems (not yet endorsed)
- East African Action Plan, 1981

The extent to which the geographical area of coverage of the major regional intergovernmental agreements overlaps the Agulhas-Somali Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Agulhas-Somali Current LME						
Agreement	Combined LMEs			Expanded LME		
	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[8]	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME
CCSBT	2	46	D	9	45	D
IOTC	6	99	C	24	100	C
SIOFA	<0.1	4	D	27	48	D
SWIOFC	36	88	D	81	46	D
Nairobi Convention and protocols	53	96	C	100	42	B
IMO IO PSC MOU		100	B	100		B
IOSEA	100		C	100		C
Dugong MOU						

The extent of country membership in these bodies and instruments for the Agulhas-Somali Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Agulhas-Somali Current LME											
Coastal countries in the LME	Agreements										
	Nairobi Convention				CCSBT	IOTC	SIOFA	SWIOFC	IMO IO PSC MOU	IOSEA	Dugong MOU
	2010	PA/biodiversity Protocol	Emergency Protocol	LBS Protocol							
Comoro I.	B			B	N	B		C	C	C	C
France (all)	B	B	B	B	N	B	B	C	C	C	C
Kenya	B			B	N	B		C	C	C	C
Madagascar		B	B		N	B		C		C	C
Mauritius	B			B	N	B	B	C	C	C	
Mozambique	B			B	N	B		C	C	C	C
Seychelles	B	B	B	B	N	B	B	C		C	C
Somalia	B	B	B	B	N		N	C			C
South Africa					N		N	C	C	C	
Tanzania	B			B	N	B	N	C	C	C	C
% engagement	80	40	40	80		80	29	100	70	90	80
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed											

[8] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of issues

The arrangements for the issues identified above are summarized in Table 4a-h. An overall summary is presented in Table 5.

Table 4a: Agulhas-Somali Current LME[i] – Summary for fisheries – Small pelagics and demersal finfish and invertebrates in national waters

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SWIOFC Scientific Committee	Supra-LME	3		• ABNJ fisheries are only significant for the expanded area • Role of ASCLME Project?
Policy decision-making	SWIOFC Commission	Supra-LME	1		
Planning analysis and advice	SWIOFC Scientific Committee	Supra-LME	3		
Planning decision-making	SWIOFC Commission	Supra-LME	1		
Implementation	CPs Secretariat	National Supra-LME	1		
Review and evaluation	Scientific Committee	Supra-LME	2		
Data and information	CPs Secretariat	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62		

Table 4b: Agulhas-Somali Current LME – Summary for fisheries – Small pelagics and demersal finfish and invertebrates in ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	None yet established	NA	0		• Role of ASCLME Project?
Policy decision-making	Meeting of the Parties	Supra-LME	3		
Planning analysis and advice	None yet established	NA	0		
Planning decision-making	Meeting of the Parties	Supra-LME	3		
Implementation	CPs	National Supra-LME	0		
Review and evaluation	CPs Meeting of Parties	National	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			9/21 = 43		

Table 4c: Agulhas-Somali Current LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3		• Somalia and South Africa are not members of IOTC • Does SWIOFC have any role in tuna? • Is there any regionally coordinated ASCLME approach to IOTC? • Are there stocks of small tunas that are mainly within the LME that come under IOTC? If so, does IOTC do anything with them? • Are there trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management?
Policy decision-making	IOTC Commission	Supra-LME	1		
Planning analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3		
Planning decision-making	IOTC Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	IOTC Scientific Committee	Supra-LME	2		
Data and information	IOTC Secretariat	Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4d: Agulhas-Somali Current LME – Summary for Pollution - LBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	LBS Protocol tech committee	LME	1		• The policy process for this protocol operates under the umbrella of the Nairobi convention process • Role of ASCLME Project?
Policy decision-making	LBS Protocol COP	LME	1		
Planning analysis and advice	LBS Protocol tech committee	LME	1		
Planning decision-making	LBS Protocol COP	LME	1		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	LBS Protocol tech committee LBS Protocol COP	LME	2		
Data and information	CPs Secretariat	National LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4e: Agulhas-Somali Current LME – Summary for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	National	0	IMO	• The policy process for this protocol operates under the umbrella of the Nairobi convention process • Role of ASCLME Project?
Policy decision-making	Emergency Protocol COP	Supra-LME	1		
Planning analysis and advice	CPs	National	0		
Planning decision-making	Emergency Protocol COP	Supra-LME	1		
Implementation	CPs Secretariat	National Supra-LME	1		
Review and evaluation	CPs Secretariat/IMO	National Supra-LME	1		
Data and information	CPs Secretariat/IMO	National Supra-LME	1		
Overall total and % completeness >>			5/21 = 24%		

Table 4f: Agulhas-Somali Current LME – Summary for Biodiversity – PAs					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	PA/biodiversity Protocol tech committee	Supra-LME	1		• The policy process for this protocol operates under the umbrella of the Nairobi convention process • Role of ASCLME Project?
Policy decision-making	PA/biodiversity Protocol COP Nairobi Convention COP	Supra-LME	1		
Planning analysis and advice	PA/biodiversity Protocol tech committee	Supra-LME	1		
Planning decision-making	PA/biodiversity Protocol COP	Supra-LME	1		
Implementation	CPs Secretariat	National Supra-LME	1		
Review and evaluation	PA/biodiversity Protocol tech committee PA/biodiversity Protocol COP	Supra-LME	2		
Data and information	CPs Secretariat	National Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4g: Aghulas-Somali Currents LME – Transboundary arrangement for biodiversity - specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		• This is an MOU under CMS • Role of ASCLME Project?
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4h: Agulhas-Somali Current LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Agulhas-Somali Current LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries:**		**System name: Agulhas-Somali Current**		**Region:??**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZs	10		62		SWIOFC
Fisheries – ABNJ	10		43		SIOFA
Fisheries – HMS	10		67		IOTC
Pollution - LBS	10		38		Nairobi
Pollution - MBS	10		24		
Biodiversity – PAs and	10		38		
Biodiversity - specific (sea turtles)	10		52		IOSEA MOU
Biodiversity – specific (dugong)	10		52		CMS MOU
	System architecture completeness index >>		47%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)								
Policy cycle stage	**Fisheries - EEZs**	**Fisheries - ABNJ**	**Fisheries - HMS**	**Pollution - LBS**	**Pollution - MBS**	**Pollution - PAs and general**	**Biodiversity - Specific (Sea turtles)**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	SIOFC Scientific Committee	None yet established	IOTC Scientific Committee, sub-commissions, and working parties	LBS Protocol tech committee	CPs	PA/biodiversity Protocol tech committee	IOSEA MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	SIOFC Commission	Meeting of the Parties	IOTC Commission	LBS Protocol COP	Emergency Protocol COP	PA/biodiversity Protocol COP Nairobi Convention COP	IOSEA MOU Meeting of Parties	MOU CPs
Planning analysis and advice	SIOFC Scientific Committee	None yet established	IOTC Scientific Committee, sub-commissions, and working parties	LBS Protocol tech committee	CPs	PA/biodiversity Protocol tech committee	IOSEA MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	SIOFC Commission	Meeting of the Parties	IOTC Commission	LBS Protocol COP	Emergency Protocol COP	PA/biodiversity Protocol COP	IOSEA MOU Meeting of Parties	MOU CPs
Implementation	CPs Secretariat	CPs	Countries	CPs Secretariat	CPs Secretariat	CPs Secretariat	IOSEA MOU CPs	MOU CPs
Review and evaluation	Scientific Committee	CPs Meeting of Parties	IOTC Scientific Committee	LBS Protocol tech committee LBS Protocol COP	CPs Secretariat/IMO	PA/biodiversity Protocol tech committee PA/biodiversity Protocol COP	IOSEA MOU Secretariat	Secretariat
Data and information	CPs Secretariat	CPs	IOTC Secretariat	CPs Secretariat	CPs Secretariat/IMO	CPs Secretariat	IOSEA MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	1	0	1	0	0	0	0	0.3
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.14	0.11	0.14	0.11	0.11	0.11	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, the two arrangements for fisheries in the areas within national jurisdiction (SWIOFC) and demersal resources in ABNJ (SIOFA) are supposed to be closely connected but given the fact that the latter is not fully operational, it is difficult to tell if this is happening. The arrangements for pollution and biodiversity that fall under the Nairobi Convention are also linked. However neither of these sets appears to be integrated with each other or with the tuna arrangement. Further, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. However, the ASCLME Project appears to be performing that role. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Agulhas-Somali Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Agulhas-Somali Current LME	Completeness	Integration	Engagement
	47%	0.1	69%

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Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share

the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Antarctica LME

1 The system to be governed

The system is the Antarctica LME. This unique LME is very fragile and is considered a low productivity ecosystem based on its extreme weather conditions. It covers a surface area of about 3 million km^2 within the marine waters of Antarctica (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 57), so a review is not provided here.

Table 1. Percentage of Antarctica LME area taken up by the EEZ of each country and the High Seas

Country (N to S)	Percent of LME area
Antarctica	99.6
High Seas	0.4

2 Governance arrangements

2.1 Transboundary Issues to be governed

The issues to be addressed by governance were identified in the:

- Fisheries
  - prevalence of demersal catches; possible depletion of the Antarctic cod, ice fish, and Patagonian toothfish; potential for overfishing
- Biodiversity
  - mass removal of baleen whales; negative impact from UV radiation on surface phytoplankton productivity, causing damage in the eggs and larvae of ice fish and lack of hemoglobin in Antarctic fish; disruption to the food web (caused by increased acidity)
- Pollution
  - chemical contaminants (copper, lead, zinc and cadmium) leaching from rubbish dumped in old tip sites, machinery parts and fuel drums during the summer melt; possible negative effects from tourists and scientists at laboratory stations
- Climate Change
  - negative impacts from anthropogenic environmental change; increased UV radiation; increased acidity; ice shelves disintegration

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

In general, Antarctica and the surrounding waters have a special status that requires international cooperation. However, the key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements governing this LME are:

1. Antarctic Treaty System (ATS)
    a. Protocol on Environmental Protection
2. Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)
3. Convention for the Conservation of Antarctic Seals (CCAS)
4. The International Commission for the Conservation of Atlantic Tunas (ICCAT)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Antarctica LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Antarctica LME (area = 2,715,109 km^2)

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Antarctic Treaty System (ATS) and its Protocol	13	100	C
Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)	8	100	C
Convention for the Conservation of Antarctic Seals (CCAS)	13	100	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	34	D

The extent of country membership in these bodies and instruments for the Antarctica LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Antarctica LME

Countries participating in Agreements in the LME[2]	Agreements				
	ATS	Env Protocol	CCAMLR	CCAS	ICCAT
Argentina	B	B	B	B	
Austria	B	C			
Australia	B	B	B	B	
Belarus	B	B			

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

[2] Note: The Antarctic LME is a special case with regard to countries in the LME. As such, only those countries who have ratified the Antarctic Treaty are listed in this Table. Similarly, only those countries within the list that have ratified ICCAT are indicated with a B.

Table 3. Country membership in regional marine agreements relevant to the Antarctica LME					
Countries participating in Agreements in the LME[2]	Agreements				
	ATS	Env Protocol	CCAMLR	CCAS	ICCAT
Belgium	B	B	B	B	
Brazil	B	B		B	B
Bulgaria	B	B	B	B	
Canada	B	B	B	B	B
Chile	B	B	B	B	
China	B	B	B	B	B
Colombia	B	C			
Cuba	B	C			
Czech Republic	B	B			
Denmark	B	C			
Ecuador	B	B			
Estonia	B				
European Union					B
Finland	B	B	B		
France	B	B	B	B	B
Germany	B	B	B	B	
Greece	B	B			
Guatemala	B	C			
Hungary	B	C			
India	B	B	B		
Italy	B	B	B	B	B
Japan	B	B	B	B	B
Korea (North)	B	C			
Korea (South)	B	B	B		B
Malaysia	B				
Monaco	B	B			
Netherlands	B	B	B		
New Zealand	B	B	B	B	
Norway	B	B	B	B	B
Pakistan	B	B	B		
Papua New Guinea	B	C			
Peru	B	B	B	B	
Poland	B	B	B	B	
Portugal	B				
Romania	B	B			
Russian Federation	B	B	B	B	B
Slovak Republic	B	C			
South Africa	B	B	B	B	B
Spain	B	B	B		
Sweden	B	B	B		
Switzerland	B	C			

Table 3. Country membership in regional marine agreements relevant to the Antarctica LME					
Countries participating in Agreements in the LME[2]	Agreements				
	ATS	Env Protocol	CCAMLR	CCAS	ICCAT
Turkey	B	C			B
Ukraine	B	B			
United Kingdom	B	B	B	B	B
United States	B	B	B	B	B
Uruguay	B	B	B		B
Venezuela	B				B
% engagement	100	70	54	40	32
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a. Antarctica LME[1] – Transboundary arrangement for Pollution(LBS and MBS), Fisheries (EEZ-ABNJ) and Biodiversity - General					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Policy decision-making	Antarctic Treaty Consultative Meeting (ATCM)	Supra-LME	3		
Planning analysis and advice	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Planning decision-making	Antarctic Treaty Consultative Meeting (ATCM)	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	ATCM, supported by the CEP reviews implementation of measures	Supra-LME	2		
Data and information	Joint Committee on Antarctica Data Management	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4b. Antarctica LME – Transboundary arrangement for Pollution(LBS and MBS)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Protocol on Environmental Protection - Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Policy decision-making	None specific to protocol (uses AT decision-making body)		0		
Planning analysis and advice	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Planning decision-making	None specific to protocol (uses AT decision-making body)		0		
Implementation	Countries	National	0		
Review and evaluation	CEP reviews implementation of measures	Supra-LME	2		
Data and information	Joint Committee on Antarctica Data Management	Supra-LME	3		
Overall total and % completeness >>			11/21 = 53%		

Table 4c. Antarctica LME – Transboundary arrangement for Biodiversity – Specific (Seals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CCAS Scientific Committee on Antarctic Research (SCAR).	Supra-LME	3		
Policy decision-making	None (uses Antarctic Treaty Consultative Meeting)		0		
Planning analysis and advice	CCAS Scientific Committee on Antarctic Research (SCAR).	Supra-LME	3		
Planning decision-making	None (uses Antarctic Treaty Consultative Meeting)		0		
Implementation	Countries	National	0		
Review and evaluation	CCAS Scientific Committee on Antarctic Research (SCAR).	Supra-LME	0		
Data and information	Countries CCAS Scientific Committee on Antarctic Research (SCAR)	National Supra-LME	3		
Overall total and % completeness >>			9/21 = 43%		

Table 4d. Antarctica LME – Transboundary arrangement for Fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance, Standing Committee on Administration and Finance.	Supra-LME	3		
Policy decision-making	CCAMLR Commission	Supra-LME	3		
Planning analysis and advice	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance, Standing Committee on Administration and Finance.	Supra-LME	3		
Planning decision-making	CCAMLR Commission	Supra-LME	3		
Implementation	Countries	National	1		
Review and evaluation	Scientific Committee Standing Committee on Implementation and Compliance (SCIC)	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e. Antarctica LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 5: Antarctica LME governance architecture - System summary[ii]				
IW category: Marine region	**Countries:**	**System name:** Antarctica		**Region:** Antarctic
Complete these columns then assess issues using the arrangements tables		*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries –EEZ/ABNJ		86%		CCAMLR
Fisheries – large pelagics (tunas and tuna-like)		81%		ICCAT
Biodiversity – Specific (Seals)		43%		CCAS
Pollution – MBS		81%		Antarctic Treaty
Pollution –LBS		81%		Antarctic Treaty
Biodiversity – General		81%		Antarctic Treaty
Pollution – MBS		53%		AT Env. Protocol
Pollution – LBS		53%		AT Env Protocol
	System architecture completeness index >>	70%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-4e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a - e)

Policy cycle stage	Fisheries - HMS	Fisheries – EEZ/ABNJ	Pollution - LBS	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - Specific (Seals)
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance, Standing Committee on Administration and Finance.	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Protocol on Environmental Protection - Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Protocol on Environmental Protection - Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	CCAS Scientific Committee on Antarctic Research (SCAR).
Policy decision-making	ICCAT Commission	CCAMLR Commission	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	None specific to protocol (uses AT decision-making body)	None specific to protocol (uses AT decision-making body)	None (uses Antarctic Treaty Consultative Meeting)
Planning analysis and advice	ICCAT SCRS and Species Panels	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance,	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	CCAS Scientific Committee on Antarctic Research (SCAR).

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a - e)								
Policy cycle stage	**Fisheries - HMS**	**Fisheries – EEZ/ABNJ**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - Specific (Seals)**
		Standing Committee on Administration and Finance.	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	
Planning decision-making	ICCAT Commission	CCAMLR Commission	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	None specific to protocol (uses AT decision-making body)	None specific to protocol (uses AT decision-making body)	None (uses Antarctic Treaty Consultative Meeting)
Implementation	Countries	Countries	Countries	Countries	Countries	Countries	Countries	Countries
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Scientific Committee Standing Committee on Implementation and Compliance (SCIC)	ATCM, supported by the CEP reviews implementation of measures	ATCM, supported by the CEP reviews implementation of measures	ATCM, supported by the CEP reviews implementation of measures	CEP reviews implementation of measures	CEP reviews implementation of measures	CCAS Scientific Committee on Antarctic Research (SCAR).
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries Secretariat	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Countries CCAS Scientific Committee on Antarctic Research (SCAR)

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	1	0	1	0	0	0	0	0.29
2 and 4	1	0	1	0	0	0	0	0.29
2 and 5	1	0	1	0	0	0	0	0.29
2 and 6	1	0	1	0	0	0	0	0.29
2 and 7	1	0	1	0	0	0	0	0.29
2 and 8	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	0	1	1	0.86
3 and 5	1	1	1	1	0	1	1	0.86
3 and 6	1	0	1	0	0	0	1	0.43
3 and 7	1	0	1	0	0	0	1	0.43
3 and 8	1	0	1	0	0	0	0	0.29
4 and 5	1	1	1	1	0	1	1	0.86
4 and 6	1	0	1	0	0	0	1	0.43
4 and 7	1	0	1	0	0	0	1	0.43
4 and 8	1	0	1	0	0	0	0	0.29
5 and 6	1	0	1	0	0	0	1	0.43
5 and 7	1	0	1	0	0	0	0	0.29
5 and 8	1	0	1	0	0	0	0	0.29
6 and 7	1	0	1	0	0	1	1	0.57
6 and 8	1	0	1	0	0	1	1	0.57
7 and 8	1	0	1	0	0	0	0	0.29
Average	0.71	0.02	0.71	0.02	0	0.18	0.36	0.3

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.3 out of a possible 1.

3 Conclusions

Given that decision making for the entire Antarctic Treaty System (ATS) rests primarily with the Antarctic Treaty Consultative Meeting, comprised of contracting parties that meet the requirements of the Treaty in terms of activities within the area of competence, transboundary issues within this LME appear to be highly integrated, despite the scoring for individual agreements within the Treaty system. As such, this LME has been assigned an overall integration score of 1.0 due to the presence

of the Antarctic Treaty System (ATS) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Antarctica LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Antarctica LME	Completeness	Integration	Engagement
	70%	1.0	59%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009.The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

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0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Arabian Sea LME

1 The system to be governed

The system is the Arabian Sea LME. The Arabian Sea LME lies in the northwestern Indian Ocean between the Arabian Peninsula and India, and is bordered by Bahrain, Djibouti, India, Iran, Iraq, Kuwait, Maldives, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, United Arab Emirates (UAE) and Yemen. It covers an area of over 3.9 million km^2. A substantial component of the LME is considered high seas with the remainder the marine waters of the LME under the jurisdiction of the countries as indicated in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VI-9), so a review is not provided here. The assessment is also informed by the UNEP (2006) GIWA Thematic Report 52 for the Arabian Sea.

Table 1. Percentage of Arabian Sea LME area taken up by the EEZ of each country and the High Seas (area = 3,920,027 km^2)

Country	Percent of LME area
Bahrain	0.2
Djibouti	0.2
India	25.8
Iran	4.1
Iraq	0
Kuwait	0.3
Maldives	1.3
Oman	13.6
Pakistan	5.6
Qatar	0.8
Saudi Arabia	0.9
Somalia	3.5
UAE	1.4
Yemen	10.8
High Seas	31.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance Arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 9 (Sherman and Hempel, 2009) and the UNEP (2006) report:

- Fisheries
  - inshore coastal pelagics and demersal over-exploitation
  - maintain large oceanic tuna landings
  - bycatch in demersal fisheries exceed landings
- Pollution
  - LBS (eutrophication from sewage and industrial wastes, heavy metals, chlorinated pesticides and persistent toxic substances
  - MBS (hydrocarbon production and transportation)
- Biodiversity/Habitat modification
  - coastal development, draining of marshland and reduction in river discharges due to diversion of major river systems

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Indian Ocean Tuna Commission (IOTC)
2. Regional Commission for Fisheries(RECOFI)
3. South Indian Ocean Fisheries Agreement (SIOFA) – area of competence occupies less than 1% of the LME
4. Regional Organization for the Protection of the Marine Environment (ROPME)
5. Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment - The Jeddah Convention (Jeddah)
6. Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution.
    a. Oil Spill Protocol and Protocol concerning Marine Pollution from Exploration of the Continental Shelf
    b. Protocol concerning the Protection of the Marine Environment from Land-Based Sources
7. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)
8. South Asian Cooperative Environment Programme (SACEP)
    a. South Asian Seas Action Plan (SESAP)
9. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
10. Action Plan for the Protection of the Marine Environment and the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates, 2001
11. East African Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Arabian Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Arabian Sea LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)	6	100	C
Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment – Jeddah	55	15	D
Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution – Kuwait Convention	99	18	B
Agreement for the establishment of Regional Commission for Fisheries (RECOFI)	99	12	B
South Indian Ocean Fisheries Agreement (SIOFA)	<1	<1	D
MOU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)		100	C
South Asian Cooperative Environment Programme (SACEP)			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)		100	C

The extent of country membership in these bodies and instruments for the Arabian Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Arabian Sea LME											
Coastal countries in the LME	Agreements										
	IOTC	Jeddah	Jeddah MBS protocol	Kuwait	Kuwait MBS protocol	Kuwait Oil Spill protocol	Kuwait LBS Protocol	RECOFI	IOSEA	SACEP	Dugong MOU
Bahrain		N	N	B	B	B	B	B	C	N	C
Djibouti		B	B	N	N	N	N	N		N	
India	B	N	N	N	N	N	N	N	C	C	C
Iran	B	N	N	B	B	B	B	B	C	N	
Iraq		N	N	B	B	B	N	B	N	N	
Kuwait		N	N	B	B	B	B	B	N	N	
Maldives	B	N	N	N	N	N	N	N	C	C	
Oman	B	N	N	B	B	B	B	B	C	N	
Pakistan	B	N	N	N	N	N	N	N	C	C	
Qatar		N	N	B	B	B	B	B	N	N	
Saudi Arabia		B	B	B	B	B	B	B	C	N	C
Somalia		B	B	N	N	N	N	N		N	C

[1]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

UAE		N	N	B	B	B	C	B	C	N	C
Yemen	B	B	B	N	N	N	N	N	C	N	C
% engagement	43	100	100	100	100	100	75	100	82	100	43

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The arrangements for the issues identified above are summarized in Tables 4a - 4i. An overall summary is presented in Table 5.

Table 4a: Arabian Sea LME[i] – Transboundary Arrangements for Fisheries – HMS (tuna and tuna like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		6 of the 14 states are members of IOTC. 3 countries with the largest share of the LME are members of IOTC. Given that one-third of the LME is high-seas, should potential for countries to have a shared interest in large pelagics be higher? Why are countries not members of IOTC?
Policy decision-making	IOTC - Commission	Supra-LME	1		
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		
Planning decision-making	IOTC - Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	National Supra-LME	2		
Data and information	Countries IOTC - Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4b: Arabian Sea LME – Transboundary Arrangements for all Fisheries – EEZ (coastal pelagics and demersals, including bycatch issues)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	RECOFI - Committees, Working groups, specialists	Supra-LME	2		Neither India (largest EEZ in LME) nor Pakistan are members of RECOFI, as well as a number of other coastal countries. Why has no country ratified the Convention? Has this hampered country buy-in to address and deal with transboundary issues?
Policy decision-making	RECOFI - Commission	Supra-LME	1		
Planning analysis and advice	RECOFI - Committees, Working groups, specialists	Supra-LME	2		
Planning decision-making	RECOFI - Commission	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	RECOFI - Commission	Supra-LME	1		
Data and information	Countries	National	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4c: Arabian Sea LME – Transboundary Arrangements for Pollution - Marine-Based Sources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Kuwait Convention MBS protocols - Oil Spill Protocol and Protocol concerning marine pollution from exploration and exploitation of the continental shelf - Marine Emergency Mutual Aid Centre (MEMAC), ROPME Secretariat, IMO, Council	LME	1	PERSGA	Average of completeness scores for Kuwait Oil Spill (8/21) and Continental Shelf Exploitation (6/21) is used. What connection, if any to Jeddah Convention and MBS Protoctol? What role does SACEP and the SASAP play in LME governance of pollution and biodiversity, if any?
Policy decision-making	ROPME Council	LME	1		
Planning analysis and advice	Kuwait Oil Spill Protocol and Protocol concerning marine pollution from exploration and exploitation of the continental shelf - Marine Emergency Mutual Aid Centre (MEMAC), Secretariat, IMO, Council Jeddah Convention Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	LME	1		
Planning decision-making	Kuwait Council	LME	1		
Implementation	Countries Marine Emergency Mutual Aid Centre	National LME	0.5		
Review and evaluation	Kuwait Council	LME	1		
Data and information	Countries Marine Emergency Mutual Aid Centre Secretariat	National LME	1.5		
Overall total and % completeness >>			7/21 = 33%		

Table 4d: Arabian Sea LME – Transboundary Arrangements for Pollution - Marine-Based Sources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Marine Emergency Mutual Aid Centre	Supra-LME	3	ROPME	What connection, if any to Kuwait Convention and MBS Protocols? How do countries who are parties to both conventions deal with the two instruments? What role does SACEP and the SASAP play in regional governance of pollution and biodiversity, if any?
Policy decision-making	PERGSA Council	Supra-LME	1		
Planning analysis and advice	Marine Emergency Mutual Aid Centre	Supra-LME	3		
Planning decision-making	PERGSA Council	Supra-LME	1		
Implementation	Countries Marine Emergency Mutual Aid Centre	National Supra-LME	1		
Review and evaluation	PERSGA Council	Supra-LME	2		
Data and information	Countries Marine Emergency Mutual Aid Centre	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4e: Arabian Sea LME – Transboundary Arrangement for Pollution - Land-Based Sources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ROPME Secretariat	LME	1	PERSGA	What role does SACEP and the SASAP play in regional governance of pollution and biodiversity?
Policy decision-making	Kuwait Council	LME	1		
Planning analysis and advice	ROPME Secretariat	LME	1		
Planning decision-making	Kuwait Council	LME	1		
Implementation	Countries	National	0		
Review and evaluation	Kuwait Council	LME	1		
Data and information	Countries ROPME Secretariat	National LME	1		
Overall total and % completeness >>			6/21 = 29%		

Table 4f: Arabian Sea LME – Transboundary Arrangement for Pollution - Land-Based Sources and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Jeddah Convention - PERSGA Secretariat, Partner IGOs	Supra-LME	1	ROPME	Jeddah LBS Protocol formulated but not in force so the Convention scores are used for LBS and Biodiversity in the absence of protocols being in force. What role does SACEP and the SASAP play in regional governance of pollution and biodiversity in this LME, if any?
Policy decision-making	Jeddah Council	Supra-LME	1		
Planning analysis and advice	Jeddah Convention - PERSGA Secretariat Partner IGOs	Supra-LME	1		
Planning decision-making	Jeddah Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Jeddah Council Jeddah Committee for the Settlement of Disputes	LME	2		
Data and information	Countries PERSGA Secretariat	National Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4g: Arabian Sea LME – Transboundary Arrangement for Biodiversity - General					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Countries Kuwait Judicial Commission	National LME	1	PERSGA	Used scores from Kuwait Convention for addressing Biodiversity concerns What role does SACEP and the SASAP play in regional governance of pollution and biodiversity?
Policy decision-making	Kuwait Council	LME	1		
Planning analysis and advice	ROPME Secretariat	LME	1		
Planning decision-making	Kuwait Council	LME	1		
Implementation	Countries	National	1		
Review and evaluation	Kuwait Council	LME	1		
Data and information	Countries ROPME Secretariat	National LME	1		
Overall total and % completeness >>			7/21 = 33%		

Table 4h: Arabian Sea LME – Transboundary Arrangement for Biodiversity – Specific (Marine Turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Policy decision-making	Meeting of Parties	Supra-LME	2		
Planning analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Planning decision-making	Meeting of Parties	Supra-LME	2		
Implementation	Countries	National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	Countries	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4i: Arabian Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Arabian Sea LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Bahrain, Djibouti, India, Iran, Iraq, Kuwait, Maldives, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, UAE and Yemen**	**System name: Arabian Sea**		**Region: Northern Indian Ocean**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (tuna and tuna like species)	14		67%		Used Regional Sea Convention for LBS scoring
Fisheries – EEZ (coastal pelagics and demersals) in the EEZ of coastal countries	14		43%		Used Regional Sea Convention for Biodiversity scoring
Pollution - Marine-Based Sources	14		33%		Kuwait MBS protocols
Pollution – Marine-Based Sources	14		62%		Jeddah MBS protocol
Pollution - Land-Based Sources	14		29%		Kuwait LBS protocol
Pollution - Land-Based Sources	14		38%		Jeddah
Biodiversity – General	14		33%		Kuwait
Biodiversity – General	14		38%		Jeddah
Biodiversity – Specific - turtles	14		52%		
Biodiversity – specific (dugong)	14		52%		CMS MOU
	System architecture completeness index >>		45%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

While the documents used to identify issues for this LME highlighted diversion of rivers as affecting the coastal and marine environment and modification of coastal habitat, there does not appear to be any formal regional governance protocols other than the regional seas conventions for addressing these issues.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly

by extracting the information from the arrangement summaries (Tables 4a-i) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)										
Policy cycle stage	**Fisheries - HMS**	**Fisheries - General**	**Pollution - LBS**	**Pollution - LBS**	**Pollution - MBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - General**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	RECOFI - Committees, Working groups, specialists	ROPME Secretariat	Jeddah Convention - PERSGA Secretariat, Partner IGOs	Marine Emergency Mutual Aid Centre	Kuwait Convention MBS protocols - Marine Emergency Mutual Aid Centre (MEMAC), ROPME Secretariat, IMO, Council	Jeddah Convention - Secretariat, Partner IGOs	Countries Kuwait Judicial Commission	Countries Secretariat Advisory Committee	MOU CPs
Policy decision-making	IOTC - Commission	RECOFI - Commission	Kuwait Council	Jeddah Council	Jeddah Council	Kuwait Council	Jeddah Council	Kuwait Council	Meeting of Parties	MOU CPs
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	RECOFI - Committees, Working groups, specialists	ROPME Secretariat	Jeddah Convention - PERSGA Secretariat Partner IGOs	Marine Emergency Mutual Aid Centre	Kuwait MBS Protocols Marine Emergency Mutual Aid Centre (MEMAC), Secretariat, IMO, Council	Jeddah Convention - PERSGA Secretariat Partner IGOs	ROPME Secretariat	Countries Secretariat Advisory Committee	MOU CPs
Planning decision-making	IOTC - Commission	RECOFI - Commission	Kuwait Council	Jeddah Council	Jeddah Council	Kuwait Council	Jeddah Council	Kuwait Council	Meeting of Parties	MOU CPs
Implementation	Countries	Countries	Countries	Countries	Countries Marine Emergency Mutual Aid Centre	Countries Marine Emergency Mutual Aid Centre	Countries	Countries	Countries	MOU CPs

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)										
Policy cycle stage	**Fisheries - HMS**	**Fisheries - General**	**Pollution - LBS**	**Pollution - LBS**	**Pollution - MBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - General**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	RECOFI - Commission	Kuwait Council	Jeddah Council Jeddah Committee for the Settlement of Disputes	Jeddah Council	Kuwait Council	Jeddah Council Jeddah Committee for the Settlement of Disputes	Kuwait Council	Secretariat	Secretariat
Data and information	Countries IOTC - Secretariat	Countries	Countries ROPME Secretariat	Countries PERSGA Secretariat	Countries Marine Emergency Mutual Aid Centre	Countries Marine Emergency Mutual Aid Centre Secretariat	Countries PERSGA Secretariat	Countries ROPME Secretariat	Countries	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	1	1	1	1	0	1	1	0.86
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	1	1	1	0	1	1	0.71
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	0	1	0	0.43
4 and 6	0	0	0	0	0	0	0	0
4 and 7	1	1	1	1	0	1	1	0.86
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
5 and 6	1	0	1	0	1	0	1	0.57
5 and 7	0	1	0	1	0	1	0	0.43
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	1	0	1	0	1	0	0.43

6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
8 and 10	0	0	0	0	0	0	0	0
9 and 10	0	0	0	0	0	0	0	0
Average	0.07	0.13	0.11	0.13	0.02	0.13	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

While this LME has two separate regional seas agreements in place covering pollution (LBS and MBS) and biodiversity (Kuwait and Jeddah Conventions and protocols), no overarching integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal. In terms of the fisheries arrangements, these are also not formally integrated although it is conceivable that informal linkages may be present at some level.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Arabian Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Arabian Sea LME	Completeness	Integration	Engagement
	45%	0.1	86%

4 References

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Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.
Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.
Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.
Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.
Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.
Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.
Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.
System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Baltic Sea LME

1 The system to be governed

The system is the Baltic Sea LME. It is the world's largest brackish water body, covering an area of over 385,000 km^2 of the nine riparian countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter 35), so a review is not provided here.

Table 1. Percentage of Baltic Sea LME area taken up by the EEZ of each country and the High Seas (area = 385,735 km^2)

Country	Percent of LME area
Denmark	5.4
Estonia	9.1
Finland	21.1
Germany	3.9
Latvia	7.3
Lithuania	1.5
Poland	8.1
Russia	5.9
Sweden	37.0
High Seas	0.7

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
  - severe overexploitation and unsustainable fisheries (cod, herring, salmon & eel)
  - increasing fish mortality; excessive bycatch and discards and destructive fishing practices
- Pollution
  - severe eutrophication (agricultural discharges via rivers); increased occurrence of HABs; localized microbiological pollution; heavy metal concentration;
  - ballast water from oil tankers
- Biodiversity
  - decreased viability of stocks in the ecosystem caused by pollution and diseases; invasive/alien species (ballast water from oil tankers)
  - habitat modification mainly from human settlements, pollution and coastal construction
  - biotope complexes are exposed all kinds of anthropogenic threat (e.g. threatened sandy foreshores and lagoons).

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. International Council for the Exploration of the Sea (ICES)
3. Convention on the Protection of the Marine Environment of the Baltic Sea Area - Helsinki Convention (HELCON)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. The Council of Baltic Sea States (CBSS)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR) and its Annexes (which are contained within the Convention.
    a) Annex I: Prevention and elimination of pollution from land-based sources;
    b) Annex II: Prevention and elimination of pollution by dumping or incineration;
    c) Annex III: Prevention and elimination of pollution from offshore sources; and
    d) Annex IV: Assessment of the quality of the marine environment.
8. OSPAR Action Plan 1998-2003
9. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
10. European Union Common Fisheries Policy (CFP)
11. European Union Maritime Policy
12. The Baltic Sea Joint Comprehensive Environmental Action Programme, 1992

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Baltic Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Baltic Sea LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
International Council for the Exploration of the Sea (ICES)	3	100	C
Convention on the Protection of the Marine Environment of the Baltic Sea Area - Helsinki Convention (HELCON)	98	93	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	2	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	2	100	C
OSPAR Convention	<1	7	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	18	100	C
European Union Common Fisheries Policy (CFP)	10	93	D
European Union Maritime Policy	10	93	D

The extent of country membership in these bodies and instruments for the Baltic Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Baltic Sea LME								
LME coastal countries	Agreement							
	ICES	HELCON	NAMMCO	NASCO	OSPAR	Bonn Agreement	ASCOBANS	EU-CFP
Denmark	B	B			B	B	B	B
Estonia	B	B			N		C	B
Finland	B	B			B		B	B
Germany	B	B			B	B	B	B
Latvia	B	B			N		C	B
Lithuania	B	B			N		B	B
Poland	B	B			N		B	B
Russia	B	B		B			C	
Sweden	B	B		B	B	B	B	B
% engagement	100	100	0	22	80	33	67	89
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The arrangements for the issues identified above are summarized in Table 4a-g. An overall summary is presented in Table 5.

Table 4a: Baltic Sea LME[i] – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only 2 of the 9 coastal states are members Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Baltic Sea LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Only Denmark (through Greenland and Faroe Islands) is a member of NAMMCO among the Baltic States. What role does ICES play?
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Baltic Sea LME – Transboundary Arrangement for Pollution – LBS and Habitat Modification					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	HELCOM - Heads of Delegation (Agriculture/Env. Forum; Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Habitat group HELCOM Land Group HELCOM Response Group	LME	3		All Baltic States are members What role does ICES play?
Policy decision-making	HELCON Commission	LME	1		
Planning analysis and advice	Secretariat HELCOM Monitoring and Assessment Group HELCOM Habitat group HELCOM Land Group HELCOM Response Group	LME	2		
Planning decision-making	HELCON Commission	LME	1		
Implementation	Countries	National	1		
Review and evaluation	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	LME	2		
Data and information	Countries Secretariat	National LME	2		
Overall total and % completeness >>			12/21 = 57%%		
Table 4d: Baltic Sea LME – Transboundary Arrangement for Pollution – MBS leading to decreased viability of stocks in the ecosystem caused by pollution and					

diseases; invasive/alien species (ballast water from oil tankers)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	HELCOM - Heads of Delegation (Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	LME	3		All Baltic States are members What role does ICES play?
Policy decision-making	HELCON Commission	LME	1		
Planning analysis and advice	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	LME	2		
Planning decision-making	HELCON Commission	LME	1		
Implementation	Countries	National	1		
Review and evaluation	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	LME	2		
Data and information	Countries Secretariat	National LME	2		
Overall total and % completeness >>			12/21 = 57%%		

Table 4e: Baltic Sea LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4f:Baltic Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4g: Baltic Sea LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Baltic Sea LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Denmark, Estonia, Finland, Germany, Latvia Lithuania, Poland Russia, Sweden**	**System name: Baltic Sea**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – specific (salmon)	9		57%		NASCO
Fisheries – Specific (marine Mammals)	9		71%		NAMMCO
Fisheries – EEZ	9		90%		EU-CFP
Pollution – LBS	9		57%		HELCON
Pollution – MBS	9		57%		HELCON
Pollution – MBS	9		38%		Bonn
Biodiversity – General	9		57%		HELCON
Biodiversity – Specific (Small Cetaceans)	9		62%		
	System architecture completeness index >>		61%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)								
Policy cycle stage	**Fisheries - Salmon**	**Fisheries - Mammals**	**Fisheries - EEZ**	**Pollution - MBS**	**Pollution - MBS**	**Pollution – LBS**	**Biodiversity - General**	**Biodiversity - Specific**
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Bonn Agreement – Contracting Parties	HELCOM - Heads of Delegation (Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	HELCOM - Heads of Delegation (Agriculture/Env. Forum; Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	HELCOM - Heads of Delegation (Agriculture/Env. Forum; Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	ASCOBANS Advisory Committee
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	European Commission	Meeting of the Parties	HELCON Commission	HELCON Commission	HELCON Commission	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Management Committee and Scientific Committee	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Contracting Parties	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	ASCOBANS Advisory Committee
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	European Commission	Meeting of the Parties	HELCON Commission	HELCON Commission	HELCON Commission	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme	Contracting Parties Scientific, Technical and	Contracting Parties	Countries	Countries	Countries	Contracting Parties

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)								
Policy cycle stage	**Fisheries - Salmon**	**Fisheries - Mammals**	**Fisheries - EEZ**	**Pollution - MBS**	**Pollution - MBS**	**Pollution – LBS**	**Biodiversity - General**	**Biodiversity - Specific**
		for Hunting	Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)					
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	Commission STECF	Meeting of the Parties	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	Meeting of the Parties
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	Countries NAMMCO Secretariat	Contracting Parties Commission STECF Advisory Councils	Contracting Parties	Countries Secretariat	Countries Secretariat	Countries Secretariat	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	0	1	1	0.9
5 and 7	1	1	1	1	0	1	1	0.9
5 and 8	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	0	1	1	0.9
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.1	0.1	0.1	0.1	0	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

The arrangement for pollution (both marine and land-based) and biodiversity in this LME - the Helsinki Convention - appears to be well integrated. This Convention also has structural components that address fisheries and biodiversity and as such, provides an integrating mechanism for the LME at a level that is lacking in most LMEs. The extent to which HELCON has any formal linkages with NASCO and NAMMCO is not clear. It is also likely that ICES provides a common science advisory role within all of the arrangements.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Baltic Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Baltic Sea LME	Completeness	Integration	Engagement
	61%	0.1	61%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Barents Sea LME

1 The system to be governed

The system is the Barents Sea LME. It is relatively shallow sea with a surface area of over 1.9 million km^2 spanning the countries of Denmark, Norway and Russia (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter XIII-36), so a review is not provided here.

Table 1. Percentage of Barents Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,977,922 km^2

Country	Percent of LME area
Denmark	<0.1
Norway	43.0
Russia	54.1
High Seas	2.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
  - severe overexploitation of the major fish stocks (cod and haddock); increasing number of collapsed stocks
  - destruction of the bottom habitat by trawling also has a negative impact on cod and bottom fish, such as catfish, perch, plaice, Greenland halibut and American plaice
- Pollution
  - LBS - water mass and atmospheric advection (external sources); industrial activities; elevated levels of microbiological pollution (localized); solid waste (localized); chemical pollutants (chlorinated hydrocarbons and heavy metals)
  - MBS – hydrocarbon and other hazardous contaminants
- Biodiversity
  - Deterioration due to high levels of persistent organic contaminants
  - Habitat modification and changes in the faunal composition of benthic communities (localized)

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. North-East Atlantic Fisheries Commission (NEAFC)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR) and its Annexes (which are contained within the Convention.
    a) Annex I: Prevention and elimination of pollution from land-based sources;
    b) Annex II: Prevention and elimination of pollution by dumping or incineration;
    c) Annex III: Prevention and elimination of pollution from offshore sources; and
    d) Annex IV: Assessment of the quality of the marine environment.
8. Barents-Euro-Arctic Council (BEAC) and its regional arm, the Barents Regional Council (This arrangement seems primarily for trade and other socio-economic issues)
9. Agreement on the Conservation of Polar Bears (ACPB)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Barents Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Barents Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	10.4	97.1	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	2	100	C
International Council for the Exploration of the Sea (ICES)	14	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	10	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	10	100	C
North-East Atlantic Fisheries Commission(NEAFC)	12	82	D
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	12	81	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Barents Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Barents Sea LME

LME coastal countries	Agreement								
	AC	ICCAT	ICES	NASCO	NAMMCO	NEAFC	OSPAR	ACPB	BEAC
Denmark	C		B			B	B	B	C
Norway	C	B	B	B	B	B	B	B	C
Russia	C	B	B	B		B		B	C
% engagement	100	67	100	67	33	67	67	100	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The arrangements for the issues identified above are summarized in Table 4a-g. An overall summary is presented in Table 5.

Table 4a: Barents Sea LME[i] – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b. Barents Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Barents Sea LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		All countries are members of NASCO ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4d: Barents Sea LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	Norway and Denmark (through Greenland and Faroe islands) are members of NAMMCO but Russia is not.
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4e: Barents Sea LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals (specific)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	All 3 coastal states are members of ACPB
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Table 4f: Barents Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4g: Barents Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
		Overall total and % completeness >>	14/21 = 67%		

Table 5: Barents Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Denmark, Norway, Russia**		**System name: Barents Sea**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		
Fisheries – large pelagics (tunas and tuna-like)	3		86%		
Fisheries – specific (salmon)	3		57%		
Fisheries – Specific (Marine Mammals)	3		71%		
Pollution (LBS)	3		90%		
Pollution (LBS)	3		67%		
Pollution (MBS)	3		67%		
Pollution (MBS)	3		90%		
Biodiversity – General	3		90%		
Biodiversity - General	3		67%		
Biodiversity – Specific (Polar Bears)	3		38%		
	System architecture completeness index >>		74%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

The impacts associated with climate change in the Arctic are not specifically addressed as they are manifested in the transboundary fisheries, pollution and biodiversity concerns of the region.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - Specific**	**Fisheries Specific - Marine Mammals**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity – Polar Bears**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	ACPB – IUCN Polar Bear Specialist Group and Country experts	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	ACPB-Countries	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent	ICCAT SCRS and Species	NASCO Three	NAMMCO Managemen	OSPAR – Eutrophicati	OSPAR - Offshore	OSPAR - Biodiversity	ACPB – IUCN Polar	Arctic Council -	Arctic Council -	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - Specific**	**Fisheries Specific - Marine Mammals**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity – Polar Bears**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	Committee on Management and Science (PEMAS) ICES	Panels	Commissions NASCO Secretariat ICES	t Committee and Scientific Committee	on Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	Industry Strategy Committee and Working Groups	and Ecosystem Committee and Working Groups	Bear Specialist Group and Country experts	Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	ACPB Countries	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat –	Countries OSPAR	Countries OSPAR	Countries OSPAR	ACPB Countries	Countries	Countries	Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - Specific**	**Fisheries Specific - Marine Mammals**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity – Polar Bears**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
				Joint NAMMCO Control Scheme for Hunting	Commission Special Studies OSPAR Secretariat	Commission Special Studies OSPAR Secretariat	Commission Special Studies OSPAR Secretariat				
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMCO Council Committee on Inspection and Observation ACPB - IUCN Polar Bear Specialist Group	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	ACPB - IUCN Polar Bear Specialist Group	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat ACPB – IUCN Polar Bear Specialist Group and Country experts	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	ACPB – IUCN Polar Bear Specialist Group and Country experts	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	1	1	1	0.71
4 and 6	0	1	0	1	1	1	1	0.71
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0

5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
6 and 11	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
9 and 10	0	1	0	1	0	1	1	0.57
9 and 11	0	1	0	1	0	1	1	0.57
10 and 11	0	1	0	1	0	1	1	0.57
Average	0.02	0.11	0.02	0.11	0.05	0.11	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eleven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, none of the fisheries arrangements appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity. Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent.

It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak. Nonetheless, this LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to potentially function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Barents Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Barents Sea LME	Completeness	Integration	Engagement
	74%	1.0	75%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Bay of Bengal LME

1 The system to be governed

The system is defined as the Bay of Bengal LME. This includes the marine waters under the jurisdiction of Bangladesh, India, Indonesia, Malaysia, Myanmar, Sri Lanka and Thailand. While the Maldives is considered to be a part of this LME from the perspective of the GEF Bay of Bengal LME Project, its waters do not overlap the LME as originally defined (Table 1)[1]. Therefore if the LME is an ecological unit and the aim is to manage it as such, the Maldives does not actually have a stake in the ecosystem. There may nonetheless good reasons to include it from a functional cooperation perspective.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009 Chapter VII-10) so no review is provided here. This assessment is also informed by the BOBLME TDA (2012a, 2012b) and the GEF institutional review (GEF 2011)

Table 1. Percentage of LME area taken up by the EEZ of each country and the High Seas for the original LME (3 647 858 km2) and for the extended BOBLME Project area (6 253 373 km^2)

	Percent of area	
Country	original LME	BOBLME Project
Bangladesh	2.1	1.3
India	34.1	21.1
Indonesia	7.9	11.6
Malaysia	1.9	1.1
Maldives	0.0	14.6
Myanmar	14.1	8.2
Sri Lanka	10.8	8.5
Thailand	3.2	1.9
High Seas	25.9	31.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The following areas of concern were identified in the TDA (2012):

- Overexploitation of marine living resources
- Degradation of mangroves, coral reefs and seagrass
- Pollution and water quality

In terms of issues requiring separate governance arrangements the above areas of concern have been broken out into the following issues:

- Fisheries
    - small pelagic resources

[1] A similar issue arises in the East: why is only part of the Sumatra East coast included, while the Indonesian Fisheries Management Area 571 includes the entire coast line. Also where actually is the southeastern boundary? Port Klang? One fathom bank?

    - demersal finfish fisheries (including reefs?)
    - tuna resources
- Habitat degradation and modification
    - mangroves, coral reefs and seagrass
    - degradation and modification of seabed habitat and seamounts
- Pollution
    - LBS.

From a transboundary governance perspective it is desirable to combine the above issues under as few governance arrangements as possible. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of sharks or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement. Similarly, the issue of lost and discarded fishing gear was noted under pollution, but is probably best dealt with as a fishery issue.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are listed below. Their overlap with the BOB LME is shown in table 2.

- Agreement on the Institutionalization of the Bay of Bengal Programme as an Inter-Governmental Organisation (BOBP-IGO)[2]
- Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)
- Asia Pacific Fisheries Commission – FAO (APFIC)
- South East Asian Fisheries Development Center (SEAFDEC)
- Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), Working Committee on Fisheries[3]
- Network of Aquaculture Centers in Asia-Pacific (NACA)

[2] The Agreement on the Institutionalization of the Bay of Bengal Programme as an Inter-Governmental Organisation was signed in April 2003 in Chennai, India (with the Maldives signing in May 2003. The Agreement evolved from the FAO Bay of Bengal Programme (1979 to 2000). http://www.bobpigo.org. Its objective is to support the development and management of sustainable coastal fisheries

[3] Nag, B. and D. De. 2007. Asian Integration Process and BIMSTEC. Centre for Studies in International Relations and Development Discussion Paper #35.

- South Asia Cooperative Environment Programme (SACEP)[4], South Asian Seas Action Plan (SASAP)
- South Asian Association for Regional Cooperation (SAARC), Convention on Co-operation on Environment (2010)[5]
- ASEAN, ASWG Fisheries and Coastal and Marine Environment
- Coordinating Body on the Seas of East Asia (COBSEA)[6]
- Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
- Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
- East African Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Bay of Bengal LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Bay of Bengal LME

Agreement	Original LME			Expanded LME		
	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[7]	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME
IOTC	6	99	C	10	100	C
APFIC	23	84	D	23	49	D
BOBP-IGO	100	61	B	100	36	B
FFA	<1	1	D	<1	<1	D
SEAFDEC	13	71	D	20	65	D
WCPFC	<1	1	D	<1	<1	D
SIOFA	0	0		2	<1	D
SWIOFC	0	0		4	3	D
Dugong MOU	?	100	C	?	100	C
IOSEA	?	100	C	?	100	C
COBSEA	5	18	D	8	16	D
SACEP			D	70	55	D

[4] SACEP is a cooperation agreement. There is no Regional Seas convention yet.

[5] Convention not yet in force

[6] UNEP Regional Seas Programme

[7] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Bay of Bengal LME is shown in Table 3.

Table 3. Country membership in arrangements relevant to the Bay of Bengal LME

Countries	Arrangement											
	BOB-IGO	IOTC	APFIC	SACEP[8]	COBSEA	SAARC	SEAFDEC	ASEAN	PEMSEA	IOSEA	Dugong MOU	BIMSTEC
Bangladesh	B	N	B	C	N	C	N	N	N	C	C	C
India	B	B	B	C	N	C	N	N	N	C	C	C
Indonesia		B	B	N	C	N	C	C	C	C		N
Malaysia	N	B	B	N	C	N	C	C	N	C		N
Maldives	B	B	N	C	N	C	N	C	N	C		N
Myanmar	N	N	B	N	N	N	N	C	N	C	C	C
Sri Lanka	B	B	B	C	N	C	N	N	N	C	C	C
Thailand		B	B	N	C	N	C	C	C	C	C	C
% engagement	50	86	88	100	100	100	100	100	100	100	63	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption

C = agreement to cooperate by signing

N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The arrangements for the issues identified above are summarized in Table 4a-g. An overall summary is presented in Table 5.

[8]Includes Afghanistan, Iran, Bhutan, Nepal

Table 4a: Bay of Bengal LME[I] – Transboundary arrangement for fisheries - small pelagic resources, demersal finfish and invertebrates (BOBP-IGO)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	BOBP IGO Technical Advisory Committee	Sub-LME	3	• BOBLME Project • BIMSTEC, APFIC, SEAFDEC	• Only four of the eight countries are members. • Holds sessions annually (plus special sessions and approves the work program and budget of the organization • It appears that most decisions are programmatic rather than management. • BOB IGO calls for National Plans of Action developed with assistance from the BOB IGO. Regional Plan of Action for transboundary species? • Habitat modification - degradation and modification of seabed habitat and seamounts is primarily a fisheries issue that can be dealt with under this arrangement • Lobster is covered by this arrangement
Policy decision-making	BOBP IGO Governing Council	Sub-LME	1		
Planning analysis and advice	Technical Advisory Committee	Sub-LME	3		
Planning decision-making	BOBP IGO Governing Council	Sub-LME	1		
Implementation	Countries Assistance from APFIC	National	0		
Review and evaluation	BOBP IGO Technical Advisory Committee	Sub-LME	1		
Data and information	National/BOBP IGO APFIC	Sub-LME	2		
Overall total and % completeness >>			11/21 = 52%		

Table 4b: Bay of Bengal LME – Transboundary arrangement for fisheries - small pelagic resources, demersal finfish and invertebrates (APFIC)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	APFIC Secretariat	Supra-LME	2	• BOBLME supports country engagement in APFIC	• Seven of the eight countries are members. • Is the RPOA relevant in this area?
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	APFIC Secretariat, SEAFDEC, World Fish Centre via RPOA	Supra-LME	1		
Planning decision-making	Commission	Supra-LME	1		
Implementation	CPs	National	0		
Review and evaluation	Secretariat; CPs	Supra-LME	2		
Data and information	CPs; Secretariat	Supra-LME	2		
Overall total and % completeness >>			9/21 = 43%		

Table 4c: Bay of Bengal LME – Transboundary arrangement for fisheries - tuna					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3	• BOBP-IGO is a partner in the World bank FAO ABNJ Project • BOBLME collaborates with IOTC primarily on capacity development / awareness / communication	• Bangladesh and Myanmar are not members of IOTC • IOTC also considers neritic tunas in the region • There are probably trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management
Policy decision-making	IOTC Commission	Supra-LME	1		
Planning analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3		
Planning decision-making	IOTC Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	IOTC Scientific Committee	Supra-LME	2		
Data and information	IOTC Secretariat	Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4d: Bay of Bengal LME – Transboundary arrangement for (a) pollution – LBS and MBS and (b) biodiversity - habitat degradation (reefs, mangroves and seagrasses)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SACEP Consultative Committee supported by 6 Subject Area Centres of Excellence	Sub- LME	3	PEMSEA BOBLME	• SACEP is a formally constituted regional body. While, a Regional Seas Convention for the area has not yet been adopted, the South Asian Seas Action Plan (SASAP) was adopted in March 1995. SACEP is the SASAP secretariat. SASAP only covers countries on the western side of the BOB. • Three countries on the eastern side of the BOB are covered by the COBSEA Regional Seas initiative, but COBSEA is more focussed in the South China Sea LME area
Policy decision-making	SACEP Governing Council	Sub- LME	1		
Planning analysis and advice	Consultative Committee supported by 6 Subject Area Centres of Excellence	Sub- LME	3		
Planning decision-making	CPs	Sub- LME National	1		
Implementation	CPs, Secretariat	Sub- LME	2		
Review and evaluation	Governing Council	Sub- LME	0		
Data and information	CPs, Secretariat	Sub- LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Bay of Bengal LME – Transboundary arrangement for (a) pollution – LBS and MBS and (b) biodiversity - habitat degradation (reefs, mangroves and seagrasses)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	COBSEA Secretariat	Supra-LME	1	PEMSEA	• SACEP is a formally constituted regional body. While, a Regional Seas Convention for the area has not yet been adopted, the South Asian Seas Action Plan (SASAP) was adopted in March 1995. SACEP is the SASAP secretariat. SASAP only covers countries on the western side of the BOB. • Three countries on the eastern side of the BOB are covered by the COBSEA Regional Seas initiative, but COBSEA is more focussed in the South China Sea LME area • SAARC's focus is mainly on ICZM (Maldives Unit) • The scores are the average of SACEP and COBSEA
Policy decision-making	COBSEA	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat, CPs	Supra-LME	1		
Planning decision-making	CPs	Supra-LME	1		
Implementation	CPs	Supra-LME National	2		
Review and evaluation	COBSEA	Supra-LME	0		
Data and information	CPs	Supra-LME	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4f: Bay of Bengal LME – Transboundary arrangement for biodiversity - specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4g: Bay of Bengal LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Bay of Bengal LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand		**System name:** Bay of Bengal LME		**Region:** South Asia, Indian Ocean
Complete these columns then assess issues using the arrangements tables (Table 4)			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved[3]**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - small pelagic resources, demersal finfish and invertebrates	7		52		BOBP-IGO. The fisheries arrangements are clearly defined but are largely oriented to cooperation not management. Relationships between BOB-IGO, APFIC and SEAFDEC, the major bodies, are not clear. Only APFIC has strong membership.
Fisheries - small pelagic resources, demersal finfish and invertebrates	7		43		APFIC
Fisheries - tuna	7		67		Well defined arrangement but not binding. Few BOBLME countries are members.
Pollution – LBS	7		57		These arrangements for environmental governance are weak and largely oriented towards cooperation. Membership in the strongest arrangement is only half the countries (western BOBOLME) These applicable arrangements are as follows: • Pollution LBS & MBS – SACEP, COBSEA • Biodiversity (habitat degradation) – SACEP, COBSEA
Pollution – MBS	7		57		
Pollution – LBS	7		38		
Pollution – MBS	7		38		
Biodiversity – habitat degradation	7		57		
Biodiversity – habitat degradation	7		38		
Biodiversity – specific (sea turtles)	7		52		CMS IOSEA turtle MOU
Biodiversity – specific (dugong)	7		52		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention[8]

The coastal fisheries arrangement (Table 4a) is clearly defined but is largely oriented to cooperation not management. BOBP-IGO which appears to be the lead organisation for

fisheries only has membership of four countries. Only APFIC has strong membership. It appears that all BOBLME countries could be members in these organisations and SEAFDEC. Therefore it appears that the potential is there to develop transboundary arrangements for fisheries that cover the issues and the BOBLME area well. Relationships between BOB-IGO, APFIC and SEAFDEC, the major bodies in this arrangement, are not clear from their documentation.

The IOTC represents a well-defined policy process for highly migratory fish species (Table 4b). It overlaps the Bay of Bengal LME entirely and all but two countries are members. The low scores in decision-making are because decisions are not binding, and in implementation because it is purely at the national level.

The arrangements for environmental governance (habitats, LBS) are weak from a governance perspective as they are largely oriented towards cooperation (Tables 4c, d). Coverage of the Bay of Bengal by the relevant organisations appears to be split into eastern and western groupings. Membership in the strongest arrangement, the western grouping is only half the countries. The Eastern grouping (COBSEA) is more focused in the South East Asia area. Myanmar is not a member of either grouping, but is in the COBSEA area. Roles and relationships among various organisations involved in these issues are not clear. This is likely to make it difficult for the many non-governmental organisations with an interest in these issues to engage in governance processes.

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7, from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)							
Policy cycle stage	**Fisheries - small pelagic resources, demersal finfish and invertebrates**	**Fisheries - small pelagic resources, demersal finfish and invertebrates**	**Fisheries - tuna**	**Pollution – LBS and MBS Biodiversity - habitat degradation**	**Pollution – LBS and MBS Biodiversity - habitat degradation**	**Biodiversity - specific (sea turtles)**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	BOB IGO Technical Advisory Committee	APFIC Secretariat	IOTC Scientific Committee, sub-commissions, and working parties	SACEP Consultative Committee + 6 Subject Area Centres of Excellence	COBSEA Secretariat	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	BOB IGO Governing Council	APFIC Commission	IOTC Commission	SACEP Governing Council	COBSEA	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	Technical Advisory Committee	APFIC Secretariat, SEAFDEC, World Fish Centre via RPOA	IOTC Scientific Committee, sub-commissions, and working parties	Consultative Committee supported by 6 Subject Area Centres of Excellence	COBSEA Secretariat, CPs	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	BOB IGO Governing Council	Commission	IOTC Commission	CPs	CPs	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries Assistance from APFIC	CPs	CPs	CPs, Secretariat	CPs	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	Technical Advisory Committee	Secretariat; CPs	IOTC Scientific Committee	Governing Council	COBSEA	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	National/BOB IGO APFIC	CPs; Secretariat	IOTC Secretariat	CPs, Secretariat	CPs	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	1	0.1
1 and 3	0	0	0	0	0	0	0	0.0
1 and 4	0	0	0	0	0	0	0	0.0
1 and 5	0	0	0	0	0	0	0	0.0
1 and 6	0	0	0	0	0	0	0	0.0
1 and 7	0	0	0	0	0	0	0	0.0
1 and 8	0	0	0	0	0	0	0	0.0
1 and 9	0	0	0	0	0	0	0	0.0
1 and 10	0	0	0	0	0	0	0	0.0
1 and 11	0	0	0	0	0	0	0	0.0
1 and 12	0	0	0	0	0	0	0	0.0
2 and 3	0	0	0	0	0	0	0	0.0
2 and 4	0	0	0	0	0	0	0	0.0
2 and 5	0	0	0	0	0	0	0	0.0
2 and 6	0	0	0	0	0	0	0	0.0
2 and 7	0	0	0	0	0	0	0	0.0
2 and 8	0	0	0	0	0	0	0	0.0
2 and 9	0	0	0	0	0	0	0	0.0
2 and 10	0	0	0	0	0	0	0	0.0
2 and 11	0	0	0	0	0	0	0	0.0
2 and 12	0	0	0	0	0	0	0	0.0
3 and 4	0	0	0	0	0	0	0	0.0
3 and 5	0	0	0	0	0	0	0	0.0
3 and 6	0	0	0	0	0	0	0	0.0
3 and 7	0	0	0	0	0	0	0	0.0
3 and 8	0	0	0	0	0	0	0	0.0
3 and 9	0	0	0	0	0	0	0	0.0
3 and 10	0	0	0	0	0	0	0	0.0
3 and 11	0	0	0	0	0	0	0	0.0
3 and 12	0	0	0	0	0	0	0	0.0
4 and 5	1	1	1	1	0	1	1	0.9
4 and 6	0	0	0	0	0	0	0	0.0
4 and 7	0	0	0	0	0	0	0	0.0
4 and 8	1	1	1	1	0	1	1	0.9
4 and 9	0	0	0	0	0	0	0	0.0
4 and 10	0	0	0	0	0	0	0	0.0
4 and 11	0	0	0	0	0	0	0	0.0
4 and 12	0	0	0	0	0	0	0	0.0
5 and 6	0	0	0	0	0	0	0	0.0
5 and 7	0	0	0	0	0	0	0	0.0

5 and 8	1	1	1	1	0	1	1	0.9
5 and 9	1	1	1	1	1	1	1	1.0
5 and 10	0	0	0	0	0	0	0	0.0
5 and 11	0	0	0	0	0	0	0	0.0
5 and 12	0	0	0	0	0	0	0	0.0
6 and 7	1	1	1	1	0	1	1	0.9
6 and 8	0	0	0	0	0	0	0	0.0
6 and 9	1	1	1	1	0	1	1	0.9
6 and 10	0	0	0	0	0	0	0	0.0
6 and 11	0	0	0	0	0	0	0	0.0
6 and 12	0	0	0	0	0	0	0	0.0
7 and 8	0	0	0	0	0	0	0	0.0
7 and 9	1	1	1	1	0	1	1	0.9
7 and 10	0	0	0	0	0	0	0	0.0
7 and 11	0	0	0	0	0	0	0	0.0
7 and 12	0	0	0	0	0	0	0	0.0
8 and 9	0	0	0	0	0	0	0	0.0
8 and 10	0	0	0	0	0	0	0	0.0
8 and 11	0	0	0	0	0	0	0	0.0
8 and 12	0	0	0	0	0	0	0	0.0
9 and 10	0	0	0	0	0	0	0	0.0
9 and 11	0	0	0	0	0	0	0	0.0
9 and 12	0	0	0	0	0	0	0	0.0
10 and 11	1	1	1	1	1	1	1	1.0
10 and 12	0	0	0	0	0	0	0	0.0
11 and 12	0	0	0	0	0	0	0	0.0
Average	0.12	0.12	0.12	0.12	0.03	0.12	0.14	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, there does not appear to be any agency that is formally mandated to provide transboundary integration for the issues dealt with above. The BOBLME Project may be filling this role in an unofficial capacity. It also supports integration by facilitating and catalyzing cooperative activities and capacity development.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Bay of Bengal LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Bay of Bengal LME	Completeness	Integration	Engagement
	50%	0.1	87%

4 Acknowledgements

Thanks to Dr Rudi Hermes for reviewing the assessment and providing many useful suggestions.

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0 = Countries alone
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2 = Countries and regional/global level support[vii]
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0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Beaufort Sea LME

1 The system to be governed

The system is the Beaufort Sea LME. It is a high-latitude LME bordered by northern Alaska and Canada, with a surface area of about 1,079,204 km^2. It consists of three main area components: the southern part of the deep Canada Basin, the shelf along northern Alaska and northwestern Canada including Amundsen Gulf, and the southwestern part of the Canadian archipelago including the gulfs and channels around Victoria Island. About 87% of this LME falls within the jurisdiction of Canada and the US, with the High Seas making up the remaining 13% (Table 1).

Table 1. Percentage of Beaufort Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,079,204 km^2)

Country (N to S)	Percent of LME area
Canada	64.4
United States	22.2
High Seas	13.4

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XI - 30), so a review is not provided here.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter XI - 30 (Sherman and Hempel, 2009) as follows:

- Biodiversity
    - whales and other marine mammals are vulnerable to contaminants from the oil industry
- Pollution
    - low contamination (low amounts of organo-chlorine compounds and concentrations of total polycyclic aromatic hydrocarbons (PAHs)
- Climate Change
    - changes in water flow, transport of nutrients, the loss of ice habitat

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Beaufort Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Beaufort Sea LME (area = 1,079,204 km^2)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	5.9	100	C

The extent of country membership in these bodies and instruments for the Beaufort Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Beaufort Sea LME	
Coastal countries in the LME	Agreements
	AC
Canada	C
United States	C
% engagement	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed	

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Table 4a. They are summarised in Table 5

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Iceland Shelf LME[1] – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Beaufort Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Canada, United States**		**System name: Beaufort Sea**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Pollution (MBS)	2		67%		AC
Pollution (LBS)	2		67%		AC
Biodiversity – General	2		67%		AC
	System architecture completeness index >>		67%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

The impacts associated with climate change in the Arctic are not specifically addressed as they are manifested in the transboundary fisheries, pollution and biodiversity concerns of the region.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 4a) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a)			
Policy cycle stage	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity -**
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces;	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a)			
Policy cycle stage	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity -**
	Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Senior Arctic Officials (SAO)	
Planning decision-making	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries
Review and evaluation	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	0	1	0	1	0	1	1	0.57
1 and 3	0	1	0	1	0	1	1	0.57
2 and 3	0	1	0	1	0	1	1	0.57
Average	0	1	0	1	0	1	1	0.57

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the three issues is 0.57 out of a possible 1.

3 Conclusions

The only transboundary agreement addressing the issues is the Arctic Council (AC). It appears that the AC has the potential to develop into an informal overall policy coordinating organization, its policy coordination role with respect to fisheries is weak. This LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Beaufort Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Beaufort Sea LME	Completeness	Integration	Engagement
	67%	1.0	100%

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Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

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System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Benguela Current LME

1 The system to be governed

The system is the Benguela Current LME. The percentage of the LME taken up by the marine waters of the coastal countries is shown in Table 1. There is a significant area of High Seas. A small area of the waters of the Democratic Republic of the Congo, which is not considered a Benguela Current LME coastal country does overlap the LME.

Table 1. Percentage of Benguela Current LME area taken up by the EEZ of each country and the High Seas (area = 1,455,995 km^2)

Country	Percent of LME area
Angola	32.8
Namibia	38.1
South Africa	18.9
Democratic Republic Congo	<0.1
High Seas	10.2

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter I-1), so a review is not provided here. This assessment is also informed by the TDA, SAP, PRODOC and Benguela Current Convention (UNDP 1999, UNDP 2002, BCC 2008).

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA, SAP, and documents of related organisations:

- Unsustainable fisheries
    - Shared demersals including invertebrates
    - Shared small pelagics
    - Large pelagic species – tunas and tuna-like fishes
    - Straddling and ABNJ demersals
- Deterioration in coastal water quality at local and regional levels(land and marine-based sources of pollution)
- Habitat destruction, degradation and modification of the sea bed and coastal zone
- Increased loss of biotic integrity
    - Changes in community composition, species and diversity
    - Introduction of alien species

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1) Abidjan Convention for Co-operation in the protection and Development of the Marine and Coastal Environment of the West and Central African Region - Abidjan Convention
   a) Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region
   b) Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency
   c) Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from Land-Based Sources and the Activities (LBSA) in the Western, Central and Southern Africa Region - LBS Protocol – not yet in force
2) The Benguela Current Convention and Commission
3) Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean (COMHAFAT)
4) The International Commission for the Conservation of Atlantic Tunas (ICCAT)
5) Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
6) The Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean (SEAFO)
7) Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Benguela Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Benguela Current LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
Abidjan Convention	31	98	D
Benguela Current Convention	100	90	B
COMHAFAT	5	84	D
ICCAT	1	100	C
CCSBT	1	52	D
SEAFO	1	10	D

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Benguela Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Benguela Current LME

Coastal countries in the LME	Agreements							
	Abidjan Convent-ion	Abidjan-Emergency Protocol	Abidjan-LBSA Protocol[2]	CCSBT	COM-HAFAT	ICCAT	SEAFO	Benguela Current Convention
Angola				N	B	B	B	B
Namibia				N	B	B	B	B
South Africa	B	B	B	N	N	B	B	B
% engagement	33	33	33		100	100	100	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in table 5.

[2] Not yet in force

Table 4a: Benguela Current LME[1] – Summary for fisheries – Shared small pelagics and demersals, including invertebrates					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	BCC Ecosystem Advisory Committee	National LME	3	WWF CECAF SADC Fisheries Protocol	• The Benguela Current Commission provides a full policy process for fisheries within the EEZs of the three member countries. • It is noted that there are other fisheries arrangements overlapping with the area; including CECAF, and COMHAFAT.
Policy decision-making	Ministerial Conference	National LME	3		
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	National LME	3		
Planning decision-making	Commission	National LME	3		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	National LME	2		
Data and information	BCC Ecosystem Advisory Committee	National LME	2		
Overall total and % completeness >>			=17/21 = 81%		

Table 4b: Benguela Current LME – Transboundary arrangement for fisheries – tunas and tuna-like species					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3		• All countries are members of ICCAT • Is there a regionally coordinated approach to ICCAT? • Are there stocks of small tunas occurring mainly within the LME for which ICCAT has a mandate but does little regarding management, other than catch monitoring (recreational fishing) • Are there trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management • How should southern bluefin tuna be dealt with? Is there enough fishing for in this LME to have it as a separate arrangement?
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	LME	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	SCRS and Permanent WG for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4c: Benguela Current LME – Transboundary arrangement for fisheries – straddling and ABNJ demersals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SEAFO Scientific Committee	Supra-LME	3	The extent to which BCC and SEAFO are linked is not clear from websites; even though they are in the same building. Is it an MOU?	• SEAFO is responsible for all fishery resources beyond national jurisdiction within the LME, except tunas and tuna-like species. This includes a wide range of demersal finfishes and invertebrates • The extent to which these deep sea resources for which SEAFO is responsible occur within the LME is not clear. • SEAFO is also responsible for biodiversity and has closed seamounts to fishing
Policy decision-making	SEAFO Commission	Supra-LME	3		
Planning analysis and advice	SEAFO Scientific Committee	Supra-LME	3		
Planning decision-making	SEAFO Commission	Supra-LME	3		
Implementation	SEAFO CPs	National	0		
Review and evaluation	Compliance Committee CPs	Supra-LME	2		
Data and information	CPs Scientific Committee	Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4d: Benguela Current LME – Transboundary arrangement for pollution – land and marine-based sources of pollution					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Commission Ecosystem Advisory Committee	LME	3	WWF?	• While all matters pertaining to the marine pollution are encompassed in the mandate of the BCC, coastal countries are also signatories to the Abidjan Convention. • However, there is only one protocol in effect, relating to emergency response to oil spills
Policy decision-making	Ministerial Conference	LME	3		
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Minerals and Petroleum Committee Ecosystem Health Committee	LME	3		
Planning decision-making	Commission	LME	3		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Minerals and Petroleum Committee Ecosystem Health Committee	LME	2		
Data and information	Ecosystem Advisory Committee	LME	2		
Overall total and % completeness >>			17/21 = 81%		

Table 4e: Benguela Current LME – Transboundary arrangement for biodiversity – Habitat destruction, degradation and modification of the sea bed and coastal zone, increased loss of biotic integrity (ecosystem changes, alien invasives) with EEZs					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Commission Ecosystem Advisory Committee	LME	3	WWF	• While all matters pertaining to coastal and marine biodiversity are encompassed in the mandate of the BCC, coastal countries are also signatories to the Abidjan Convention which addresses these issues. • However, there is no protocol in effect, relating to biodiversity • Note that SEAFO has a stated mandate to protect biodiversity in ABNJ in this LME.
Policy decision-making	Ministerial Conference	LME	3		
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	LME	3		
Planning decision-making	Commission	LME	3		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	LME	2		
Data and information	Ecosystem Advisory Committee	LME	2		
Overall total and % completeness >>			17/21 = 81%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Benguela Current LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** Angola, Namibia, South Africa		**System name:** Benguela Current LME		**Region:** South Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – Shared small pelagics and demersals, including invertebrates	3		81		Benguela Current Commission
Fisheries – tunas and tuna-like species	3		81		ICCAT
Fisheries – straddling and ABNJ demersals	3		76		SEAFO
Pollution – LBS	3		81		Benguela Current Commission
Pollution –MBS	3		81		
Biodiversity – Habitat destruction, degradation and modification of the sea bed and coastal zone	3		81		
	System architecture completeness index >>		80%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)					
Policy cycle stage	Fisheries – Shared small pelagics and demersals, including invertebrates	Fisheries – tunas and tuna-like species	Fisheries – straddling and ABNJ demersals	Pollution – LBS and MBS	Biodiversity – Habitat destruction, degradation and modification
Policy analysis and advice	Commission Ecosystem Advisory Committee	ICCAT Standing Committee on Research and Statistics (SCRS)	SEAFO Scientific Committee	Commission Ecosystem Advisory Committee	Commission Ecosystem Advisory Committee
Policy decision-making	Ministerial Conference	ICCAT Commission	SEAFO Commission	Ministerial Conference	Ministerial Conference
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	ICCAT SCRS and Species Panels	SEAFO Scientific Committee	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee
Planning decision-making	Commission	ICCAT Commission	SEAFO Commission	Commission	Commission
Implementation	CPs Secretariat	Countries	SEAFO CPs	CPs Secretariat	CPs Secretariat
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	Compliance Committee CPs	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee
Data and information	Ecosystem Advisory Committee	SCRS and Permanent WG for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	CPs Scientific Committee	Ecosystem Advisory Committee	Ecosystem Advisory Committee

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	1	1	1	1	1	1	1	1
1 and 5	1	1	1	1	1	1	1	1
1 and 6	1	1	1	1	1	1	1	1
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
5 and 6	1	1	1	1	1	1	1	1
Average	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.4 out of a possible 1.

3 Conclusions

It is clear in this LME that the Benguela Current Commission provides for full integration across issues in the EEZs that it covers. It is the integration between the HMS and ABNJ arrangements (ICCAT, SEAFO) and between those arrangements and the BCC that lower the score. In the broader assessment the presence of an arrangement that is clearly designed to integrate issues for the LME is overriding and a score of 1.0 is assigned for integration. This assigned score of 1.0 is due to the presence of the Benguela Current Commission with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Benguela Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Benguela Current LME	Completeness	Integration	Engagement
	80%	1.0	71%

4 References

BCC. 2008. Support to the Benguela Current Commission (BCC) – PRODOC. Benguela Current Commission, Windhoek, Namibia, 65 p.

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Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009.The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

UNDP. 1999. Benguela Current Large Marine Ecosystem Programme (BCLME) Transboundary Diagnostic Analysis (TDA). UNDP, Windhoek, Namibia, 171 p.

UNDP. 2002. Benguela Current Large Marine Ecosystem Strategic Action Programme (SAP). UNDP, UNDP, Windhoek, Namibia, 23 p.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:
Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Black Sea LME

1 The system to be governed

The system is the Black Sea LME. It has a short coastline and is an almost completely enclosed sea located off of the Mediterranean Sea. This LME falls under the shared responsibility and management of six coastal countries: Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine and includes the marine waters (Table 1).

The Black Sea is linked to the Mediterranean Sea by the narrow Bosphorus and Dardanelles Straits and to the shallow Sea of Azov by the Kerch Strait in the north. The LME covers a surface area of over 470,000 km^2

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter V-8), so a review is not provided here. This assessment is also informed by the Black Sea TDA 2007, the PRODOC and the Black Sea Strategic Action Plan (SAP) 1996.

Table 1. Percentage of Black Sea LME area taken up by the EEZ of each country and the High Seas (area = 471,876 km^2)

Country	Percent of LME area
Bulgaria	7.6
Georgia	4.9
Romania	4.4
Russia	14.4
Turkey	37.3
Ukraine	31.2
High Seas	0.1

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the Black Sea Strategic Plan (1996), the TDA (2007) and Sherman and Hempel (2009) are:

- Fisheries
  - decline commercial species and fish stocks
- Pollution
  - nutrient enrichment/eutrophication
  - chemical pollution
- Biodiversity
  - habitat modification
  - alien species introduction

According to the TDA, nutrient over-enrichment/eutrophication in the Black Sea is closely linked to other transboundary problems such as changes in marine living resources, chemical pollution and biodiversity/habitat changes.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Bucharest Convention on the Protection of the Black Sea against Pollution (1992) and its four Protocols.
    a. Protocol on Protection of the Black Sea Marine Environment Against Pollution from Land Based Sources (new 2009 Protocol on LBS and Activities not yet in force)
    b. Protocol on Cooperation in Combating Pollution of the Black Sea Marine Environment by Oil and Other Harmful Substances
    c. Protocol on the Protection of the Black Sea Marine Environment Against Pollution by Dumping
    d. The Black Sea Biodiversity and Landscape Conservation Protocol.
2. Agreement for the establishment of the General Fisheries Commission for the Mediterranean (GFCM) 2004
3. International Convention for the Conservation of Atlantic Tunas (ICCAT) 1969
4. Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)
5. European Union Common Fisheries Policy (CFP)
6. European Union Integrated Maritime Policy
7. Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, 1996
8. The revised Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea, 2009

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Black Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Black Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Convention on the Protection of the Black Sea against Pollution (three protocols) – Bucharest Convention	100	100	A
Agreement for the establishment of the General Fisheries Commission for the Mediterranean (GFCM)	16	100	C
Agreement on the Conservation of Cetaceans in the Black Sea,		100	C

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)			
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
European Union Common Fisheries Policy (CFP)	2	14	D
European Union Integrated Maritime Policy	2	14	D

The extent of country membership in these bodies and instruments for the Black Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Black Sea LME

LME coastal countries	Agreement								
	Bucharest					ACCO-BAMS	GFCM	ICCAT	EU-CFP
	Convention	LBS[2]	Emergency	Dumping	Biodiversity and Landscape				
Bulgaria	B	C	B	B	B	B	B	N	B
Georgia	B	B	B	B	B	B		N	
Romania	B	C	B	B	C	B	B	N	B
Russia	B	C	B	B	N			B	
Turkey	B	C	B	B	B		B	B	B
Ukraine	B	C	B	B	B	B		N	
% engagement	100	17	100	100	80	67	50	100	50

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-g. They are summarised in table 5.

[2] Not yet in force

Table 4a: Black Sea LME[i] – Transboundary Arrangement for Fisheries – EEZ and HS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	Supra-LME	3		Only 3 of the 6 coastal states are members of the GFCM
Policy decision-making	GFCM - Commission	Supra-LME	3		
Planning analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	Supra-LME	3		
Planning decision-making	GFCM - Commission	Supra-LME	3		
Implementation	Countries GFCM - Secretariat	National Supra-LME	2		
Review and evaluation	GFCM – Compliance Committee	Supra-LME	3		
Data and information	Countries GFCM – Secretariat GFCM - Committee on Aquaculture, Scientific Advisory Committee	National Supra-LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4b. Black Sea LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		None of the countries have ratified ICCAT. Russia and Turkey have signed. How important is tuna fishing to the countries in the LME? How important is ICCAT to the countries, especially given that there is virtually no high seas?
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4c: Black Sea LME – Transboundary Arrangement for Pollution – Land-based sources leading to eutrophication and chemical pollution					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		All 6 coastal states are members of the Bucharest Convention and have signed the Convention and its 3 protocols. A new protocol on Land-Based Sources and Activities (LBSA) is pending entry into force..
Policy decision-making	Bucharest Convention - Commission	LME	1		
Planning analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		
Planning decision-making	Bucharest Convention - Commission	LME	1		
Implementation	Countries with support from Activity Centres	LME	1		
Review and evaluation	Bucharest Convention - Commission	LME	2		
Data and information	Countries Secretariat	National LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4d: Black Sea LME – Transboundary Arrangement for Pollution – Marine-Based Sources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	LME	3		All 6 coastal states are members of the Bucharest Convention and its two marine protocol focusing on dumping and emergency
Policy decision-making	Bucharest Convention - Commission	LME	1		
Planning analysis and advice	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	LME	3		
Planning decision-making	Bucharest Convention - Commission	LME	1		
Implementation	Countries with support from Activity Centres	LME	2		
Review and evaluation	Bucharest Convention - Commission	LME	2		
Data and information	Countries Secretariat	National LME	3		
Overall total and % completeness >>			15/21 = 71%		

Table 4e: Black Sea LME – Transboundary Arrangement for Biodiversity – Biodiversity and Landscape					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		
Policy decision-making	Bucharest Convention - Commission	LME	1		
Planning analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		
Planning decision-making	Bucharest Convention - Commission	LME	1		
Implementation	Countries with support from Activity Centres	LME	1		
Review and evaluation	Bucharest Convention - Commission	LME	2		
Data and information	Countries Secretariat	National LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4f: Black Sea LME – Transboundary Arrangement for Biodiversity – Specific (Cetaceans)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ACCOBAMS Scientific Committee	Supra-LME	3		Only Russia has not signed the Agreement. The remaining 5 coastal states have ratified the agreement.
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ACCOBAMS Scientific Committee	Supra-LME	3		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	CoP	Supra-LME	2		
Data and information	Countries ACCOBAMS Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4g:Black Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5: Black Sea LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Bulgaria, Georgia, Romania, Russian Federation, Turkey, Ukraine**	**System name: Black Sea**		**Region: North East Atlantic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ and HS - GFCM	6		95%		
Fisheries – HMS (Tuna and tuna-like species) - ICCAT	6		80%		
Fisheries – EEZ - CFP	6		90%		
Pollution – Land-based sources – Bucharest protocol	6		67%		
Pollution – Marine-Based Sources – Bucharest protocol	6		71%		
Biodiversity – Hab Mod – Bucharest Convention	6		67%		
Biodiversity – Specific Cetaceans - ACCOBAMS	6		67%		
	System architecture completeness index >>		77%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The transboundary integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)							
Policy cycle stage	**Fisheries – EEZ/HS**	**Fisheries - EEZ**	**Fisheries - HMS**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity – Habitat Modification**	**Biodiversity - Cetaceans**
Policy analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	ICCAT Standing Committee on Research and Statistics (SCRS)	Bucharest Convention and LBS Protocol – Advisory Groups	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	Bucharest Convention Biodiversity and Landscape Protocol Advisory Group	ACCOBAMS Scientific Committee
Policy decision-making	GFCM - Commission	European Commission	ICCAT Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Meeting of the Parties
Planning analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	ICCAT SCRS and Species Panels	Bucharest Convention and LBS Protocol – Advisory Groups	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	Bucharest Convention Biodiversity and Landscape Protocol Advisory Group	ACCOBAMS Scientific Committee
Planning decision-making	GFCM - Commission	European Commission	ICCAT Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Countries
Implementation	Countries GFCM - Secretariat	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Countries	Countries with support from Activity Centres	Countries with support from Activity Centres	Countries with support from Activity Centres	Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)							
Policy cycle stage	**Fisheries – EEZ/HS**	**Fisheries - EEZ**	**Fisheries - HMS**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity – Habitat Modification**	**Biodiversity - Cetaceans**
Review and evaluation	GFCM – Compliance Committee	Commission STECF	Conservation and Management Measures Compliance Committee (CMMCC)	Bucharest Convention - Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	CoP
Data and information	Countries GFCM – Secretariat GFCM - Committee on Aquaculture, Scientific Advisory Committee	Contracting Parties Commission STECF Advisory Councils	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries Secretariat	Countries Secretariat	Countries Secretariat	Countries ACCOBAMS Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	0	1	1	0.6
4 and 6	0	1	0	1	0	1	1	0.6
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	0	1	1	0.6
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0	0.1	0	0.1	0	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, neither of the two arrangements for fisheries (GFCM and EU-CFP) nor the biodiversity arrangement for cetaceans (ACCOBAMS) appears to be linked formally. However, the two arrangements for land-based and marine based pollution and biodiversity (landscape/ habitat modification) under the Bucharest Convention are well connected. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Black Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Black Sea LME	Completeness	Integration	Engagement
	77%	0.1	74%

4 References

GEF. 2011. International Waters: Review of legal and institutional frameworks. UNDP, NY, 309 p.

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Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the California Current LME

1 The system to be governed

The system is the California Current LME. It has a surface area of approximately 2.2 million km^2, shared by the US and Mexico (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIV-44), so a review is not provided here. This assessment is also informed by NOAA's Integrated Ecosystem Assessment Program for the California Current LME. This is a well-studied LME due to the interest and capacity of the US. However, although efforts have been made to solicit LME funded support from GEF, the LME has not been subject to a GEF-funded TDA/SAP assessment.

Table 1. Percentage of California Current LME area taken up by the EEZ of each country and the High Seas (area = 2,205,843 km^2)

Country (N to S)	Percent of LME area
US	34.8
Mexico	34.8
High Seas	30.3

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the reviewed documents and focus on impacts arising from commercial and recreational fishing, pollution, habitat degradation, shoreline alteration, logging, agriculture, urbanization, grazing, and energy production:

- Fisheries
  - over-exploitation of salmon species
  - variability of coastal pelagics (sardines, anchovy, mackerel)
  - highly migratory large pelagics (tunas and tuna-like species)
  - decline in demeral stocks
- Pollution
  - degraded sediment quality (toxic contaminants)
  - eutrophication, pesticides and atmospheric pollution
- Biodiversity
  - high demersal bycatch in shrimp and prawn fishery
  - effects of declining fish stocks on birds, marine mammals
  - habitat modification resulting in loss of salmon spawning ground and nursery habitat and loss of coastal wetlands

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean (NPAFC)
2. Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)
3. International Pacific Halibut Commission - Convention for the Preservation of the Halibut Fishery (IPHC)
4. The North Pacific Marine Science Organization (PICES)
5. Latin American Organization for Fishery Development (OLDEPESCA)
6. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
7. MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances
8. Treaty Between the Government of the United States of America and the Government of Canada concerning Pacific Salmon (PSC) (not relevant to this LME)
9. Plan of Action for the Protection and Sustainable Development of the Marine and Coastal Areas of the North-East Pacific, 2002
10. Antigua Convention - Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Not yet in force).

The extent to which the geographical area of coverage of these bodies and instruments overlaps the California Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the California Current LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua)	28	35	D
Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)	3	100	C

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery(IPHC)	5	17	D
Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)	3	16	D
Latin American Organization for Fisheries Development (OLDEPESCA)	8	25	D
The North Pacific Marine Science Organization (PICES)	5	61	D
Treaty Between the Government of the United States of America and the Government of Canada concerning Pacific Salmon (PSC)	4	1	D
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C
MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances			

The extent of country membership in these bodies and instruments for the California Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the California Current LME

Coastal countries in the LME		Agreements							
	Antigua[2]	IATTC	IPHC	NPAFC	OLDEPESCA	PICES	PSC	IAC	MEX-US
US	N	B	B	B	N	B	B	B	B
Mexico		B	N	N	B	N	N	B	B
% engagement	0	100	100	100	100	100	100	100	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in table 5.

[2] Not Yet in Force

Table 4a: California Current LME[i] – Transboundary Arrangements for Fisheries – HMS (tuna and tuna-like species)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3	PICES?	Mexico has signed but not ratified the IATTC. What role does PICES play in providing scientific advice, if any?
Policy decision-making	IATTC - Commission	LME	3		
Planning analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3		
Planning decision-making	IATTC - Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	Committee for the Review of Implementation of Measures Adopted by the Commission	LME	3		
Data and information	Secretariat Countries	LME/National	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: California Current LME – Transboundary Arrangements for Fisheries – Specific (anadromous)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3	Pacific Salmon Commission PICES	Only ta very small US portion in the northern most part of the LME comes under the US/Canada PSC
Policy decision-making	NPAFC - Commission	LME	1		
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3		
Planning decision-making	NPAFC - Commission	LME	1		
Implementation	Countries	National	0		
Review and evaluation	NPAFC - Committee on Enforcement	LME	3		
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4c: California Current LME – Transboundary Arrangements for Fisheries – Specific (Halibut)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3	PICES	Only the northern part of the LME under the USA's jurisdiction is part of the IPHC area of competence.
Policy decision-making	IPHC - Commission	LME	3		
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3		
Planning decision-making	IPHC - Commission	LME	3		
Implementation	Countries	National	2		
Review and evaluation	IPHC – Conference Board	LME	3		
Data and information	IPHC – Conference Board	LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4d: California Current LME – Transboundary Arrangements for Biodiversity – Specific (Turtles)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: California Current LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: United States, Mexico**		**System name: California Current**		**Region: North-east Pacific**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - HMS	2		86%		
Fisheries – Specific (anadromous)	2		62%		
Fisheries – Specific (Halibut)	2		95%		
Biodiversity - Turtles	2		57%		
Pollution – MBS	2		0		
Pollution - LBS	2		0		
	System architecture completeness index >>		50%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

While the LME has a number of pollution-related (LBS and MBS) issues as well as biodiversity concerns arising from habitat modification, the Regional Seas Convention (Antigua Convention) is not yet in force. The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico. However, this action plan is reactive and is implemented once a spill has taken place to protect the shoreline and waters of the two countries in the LME. There does not appear to be any formal transboundary agreements relating to LBS of pollution.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	**Fisheries - Anadromous**	**Fisheries - HMS**	**Fisheries - Halibut**	**Biodiversity - Turtles**
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	IATTC - Scientific Advisory Committee (Art XI Annex 4)	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board. PICES	IAC Consultative and Scientific Committees
Policy decision-making	NPAFC - Commission	IATTC - Commission	IPHC - Commission	IAC Consultative Committee and CoP
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	IATTC - Scientific Advisory Committee (Art XI Annex 4)	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board. PICES	IAC Consultative and Scientific Committees
Planning decision-making	NPAFC - Commission	IATTC - Commission	IPHC - Commission	IAC CoP
Implementation	Countries	Countries	Countries	Countries
Review and evaluation	NPAFC - Committee on Enforcement	Committee for the Review of Implementation of Measures Adopted by the Commission	IPHC – Conference Board	Countries
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	Secretariat Countries	IPHC – Conference Board	Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	007	0	0.07	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0 out of a possible 1.

3 Conclusions

In this LME the two arrangements for fisheries relating to halibut and the anadromous species (IPHC and NPAFC) are assisted by PICES in the provision of policy and planning level advice. However, these arrangements are not linked in any formal way with IATTC and it is unclear to what extent PICES participates in the IATTC. In terms of pollution and biodiversity arrangements, there appears to be no formal arrangement in force although the US and Mexico has an action plan (MEXUS-PAC) to assist each other in the event of a significant spill in each other's waters that could affect the neighbouring country. Since the Antigua Convention is not yet in force, there appears to be no formal arrangements for addressing land-based or marine-based sources of pollution (other than the MEXUS-PAC action plan) in the LME. Likewise, biodiversity arrangements are limited to the Inter-American Convention for the protection of turtles.

Further, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the California Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

California Current LME	Completeness	Integration	Engagement
	50%	0	89%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

NOAA's Integrated Ecosystem Assessment (n.d.) Aavailable at http://www.st.nmfs.noaa.gov/iea/california.html

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Canadian Eastern Arctic - West Greenland LME

1 The system to be governed

The system is the Canadian Eastern Arctic - West Greenland Shelf LME. This includes the marine waters of Canada and Greenland (Table 1). The LME has a surface area of 1,385,104 km^2.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter XIX - 58), so a review is not provided here. Additionally, this assessment is informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

Table 1. Percentage of Canadian Eastern Arctic - West Greenland LME area taken up by the EEZ of each country and the High Seas (area = 1,385,104 km^2)

Country (N to S)	Percent of LME area
Canada	56.8
Denmark (Greenland)	41.2
High Seas	2.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter XIX - 58 (Sherman and Hempel, 2009) as follows:

- Fisheries
    - Historical decline in abundance of cod stocks mainly due to environmental factors and unregulated fishing directed for cod in the fjords
    - Bycatch in the Northern Prawn fishery (redfish, greenland halibut, polar cod) that has replaced cod as the major fishery
- Pollution
    - LBS - Historic metal contaminants in sediments(Pd, Hg, Zn) from mining in parts of W. Greenland; POPs and other chemicals transported from Europe, Asia and North America

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Canadian Eastern Arctic - West Greenland LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Canadian Eastern Arctic - West Greenland LME.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	7.2	98.3	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	83	D
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	18	83	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	5	83	D
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	6	83	D

The extent of country membership in these bodies and instruments for the Canadian Eastern Arctic - West Greenland LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Canadian Eastern Arctic - West Greenland LME

Coastal countries in the LME	Agreements				
	AC	ICCAT	NAFO	NAMMCO	NASCO
Canada	C	B	B		B
Denmark (Greenland)	C		B	B	B

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

% engagement	100	50	100	50	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a. Canadian Eastern Arctic West Greenland Shelf LME[i] – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Canadian Eastern Arctic West Greenland Shelf LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Denmark, Norway, Iceland**		**System name: Iceland Shelf LME**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	2		86%		NAFO
Fisheries – large pelagics (tunas and tuna-like)	2		86%		ICCAT
Fisheries – specific (marine mammals)	2		71%		NAMMCO
Fisheries – specific (salmon)	2		57%		NASCO
Pollution (LBS)	2		67%		AC
Pollution (MBS)	2		67%		AC
Biodiversity – General	2		67%		Ac
	System architecture completeness index >>		72%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a to 4e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-e)							
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council - Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NAFO General Council	ICCAT Commission	NASCO Council NASCO Three	NAMMCO Council	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-e)							
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	Fisheries Commission		Commissions - North American; West Greenland and NE Atlantic				
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Countries
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMCO Council Committee on Inspection and Observation	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	0	1	1	0.6
5 and 7	0	1	0	1	0	1	1	0.6
6 and 7	0	1	0	1	0	1	1	0.6
Average	0	0.14	0	0.14	0	0.14	0.14	0.1

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

While none of the four fisheries agreements (NAFO, ICCAT, NAMMCO, NASCO) appear to have formal linkages across the different stages of the policy cycle or with the Arctic Council, there is an integrated mechanism in the form of the Arctic Council for Pollution (LBS and MBS) and general biodiversity issues. This LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Canadian Eastern Arctic -West Greenland Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

	Completeness	Integration	Engagement
Canadian Eastern Arctic -West Greenland Shelf LME	72%	1.0	80%

4 References

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PAME. 2013. Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map. http://www.pame.is/images/Documents/PAME_revised_LME_map_with_explanatory_text_15_Aug_2013_-_Vefur.pdf

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Canadian High Arctic North Greenland Shelf LME

1 The system to be governed

The system is the Canadian High Arctic-North Greenland Shelf LME. This new LME consists of the northernmost and High Arctic part of Canada along with the adjacent part of North Greenland covering an area of about 576,000 km^2 (Table 1)

This assessment is also informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

Table 1. Percentage of Canadian High Arctic North Greenland Shelf LME area taken up by the EEZ of each country and the High Seas (area = 576,201 km^2).

Country	Percent of LME area
Canada	76.0
Denmark (Greenland)	20.6
High Seas	3.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
  - high proportion of collapsed stocks; overfishing; decimation of several whale species; slow recovery of the overexploited right whale;
- Pollution
  - high levels of PCB and DDT; presence of persistent organic pollutants (POPs)
- Climate change
  - environmental consequences and biological effects

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. North-East Atlantic Fisheries Commission (NEAFC)

8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Canadian High Arctic North Greenland Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Canadian High Arctic North Greenland Shelf LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
Arctic Council (AC)	3.1	100	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	10	D
International Council for the Exploration of the Sea (ICES)	<1	9	D
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	<1	<1	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	<1	10	D
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	<1	10	D
North-East Atlantic Fisheries Commission (NEAFC)	<1	9	D
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	<1	8	D

The extent of country membership in these bodies and instruments for the Canadian High Arctic North Greenland Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Canadian High Arctic North Greenland Shelf LME

Coastal countries in the LME	Agreements							
	AC	ICCAT	ICES	NAFO	NAMMCO	NASCO	NEAFC	OSPAR
Canada	C	B	B	B		B	N	
Greenland	C			B	B	B	B	B
% engagement	100	50	50	100	50	100	100	50

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5

Table 4a: Canadian High Arctic North Greenland Shelf LME[1] – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4b. Canadian High Arctic North Greenland Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Canadian High Arctic North Greenland Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Canadian High Arctic North Greenland Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Canadian High Arctic North Greenland Shelf LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Canadian High Arctic North Greenland Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)?	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5: Canadian High Arctic North Greenland Shelf LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Canada, Greenland**	**System name: Canadian High Arctic North Greenland Shelf**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (marine mammals)	3		71%		NAMMCO
Fisheries – specific (salmon)	3		57%		NASCO
Pollution (LBS)	3		90%		OSPAR
Pollution (LBS)	3		67%		AC
Pollution (MBS)	3		67%		AC
Pollution (MBS)	3		90%		OSPAR
Biodiversity – General	3		90%		OSPAR
Biodiversity – General	3		67%		AC
	System architecture completeness index >>		77%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS)	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive	OSPAR - Offshore Industry Strategy Committee and Working	OSPAR - Biodiversity and Ecosystem Committee and Working	Arctic Council - Arctic Contaminants Action Program; Arctic	Arctic Council - Emergency preparedness, Prevention and response; Protection of	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	ICES				Substances Committees and Working Groups	Groups	Groups	Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries	Countries
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement	Conservation and Management Measures Compliance	NASCO Council	NAMMMCO Council Committee on Inspection and	OSPAR Commission, Main Committees and Working	OSPAR Commission, Main Committees and Working	OSPAR Commission, Main Committees and Working	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	(PECCOE)	Committee (CMMCC)		Observation	Groups	Groups	Groups			
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.3
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.7
5 and 7	0	1	0	1	1	1	1	0.7
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.7
6 and 8	0	0	0	0	0	0	0	0

6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
8 and 9	0	1	0	1	0	1	1	0.6
8 and 10	0	1	0	1	0	1	1	0.6
9 and 10	0	1	0	1	0	1	1	0.6
Average	0.02	0.13	0.02	0.13	0.07	0.13	0.13	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the ten issues is 0.1 out of a possible 1.

3 Conclusions

None of the fisheries arrangements (NEAFC, ICCAT, NAMMCO and NASCO) appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity.

Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent. It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak. As such, this LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Canadian High Arctic North Greenland Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

	Completeness	Integration	Engagement
Canadian High Arctic North Greenland Shelf LME	77%	1.0	75%

4 References

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Canary Current LME

1 The system to be governed

The system is the Canary Current LME. This includes the marine waters under the jurisdiction of Morocco, Mauritania, Senegal, Guinea-Bissau, the Canary Islands (Spain), Gambia, Cape Verde. GIS analysis shows that portions of the LMEs of mainland Spain and Portugal as well as Madeira (Portugal) also lie within the LME (Table 1). These countries are not typically part of the governance arrangements for marine issues. However, the amount of overlap of these countries with the LME is minimal.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter I-3) so a review is not provided here. This assessment is also informed by the PRODOC (FAO/GEF 2009) CCLME Preliminary TDA (CCLME Project 2013).

Table 1. Percentage of LME area taken up by the EEZ of each country and the High Seas

Country (N to S)	Percent of LME area
Morocco	46
Mauritania	14
Senegal	12
Guinea-Bissau	1
Spain – Canary Islands	18
Gambia	2
Cape Verde	3
Spain – Mainland	<1
Portugal – Mainland	2
Portugal - Madeira	2
High Seas	1

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary issues to be governed

The issues to be addressed by governance were identified in the preliminary TDA (2006):

- Fisheries - declining or vulnerable small pelagic resources
- Fisheries - declining demersal finfish fisheries
- Fisheries - uncertain status of tuna resources
- Biodiversity - decline and vulnerability of elasmobranchs (sharks & rays)
- Biodiversity - decline of marine turtles
- Biodiversity - decline of cetaceans
- Biodiversity - alien invasive species
- Habitat modification - disappearance and destruction of mangroves and wetlands
- Habitat modification - degradation and modification of seabed habitat and seamounts
- Pollution - Changing salinity upstream of river mouths
- Pollution - hydrocarbons pollution (localized)
- Pollution - LBS (nutrients, sediments and pesticides).

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements. The TDA indicates a preference for three main categories of issues - fisheries, pollution, and habitat modification – and for addressing biodiversity issues under one of these headings. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of elasmobranchs or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement. Indeed, in many countries protection of these species is under fisheries legislation. IUU fishing by foreign vessels is a matter of concern that must be taken up within arrangements for fisheries.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Abidjan Convention – Abidjan Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region
    a. Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency in the Western and Central African Region – Emergency Protocol
    b. Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from Land-Based Sources and the Activities (LBSA) in the Western, Central and Southern Africa Region - LBS Protocol – not yet in force
2. RCFCASBA - Regional Convention on Fisheries Cooperation among African States Bordering on the Atlantic Ocean (Dakar Convention, 1992) 1995. This gives rise to ATLAFCO (COMHAFAT in French), the Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean.
3. CECAF - FAO Fishery Committee for the Eastern Central Atlantic (COPACE in French)
        a. Scientific Sub-Committee
            i. Working Group for Small Pelagics
            ii. Working Group for Demersal Species
            iii. Working Group for Artisanal Fisheries
4. ICCAT - International Commission for the Conservation of Atlantic Tunas
5. NEPAD - New Partnership for Africa's Development - COSMAR - Coastal and Marine Secretariat (NEPAD), Nairobi
6. PRCM - Charter of the West African Regional Marine and Coastal Conservation Partnership (PRCM), 2012
7. SRFC – Subregional Fisheries Commission (CSRP in French)(membership includes Guinea and Sierra Leone not in LME, but not Morocco), 1985

a. SRFC Access Conventions (1989 and 1993)

b. SRFC Hot Pursuit Convention 1993 (and associated 1993 Protocol)

8. Gambia River Development Authority (Guinea, Guinea-Bissau, Senegal)
9. Senegal River Development Authority (Mali, Mauritania, Senegal)
10. Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region , 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Canary Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Canary Current LME (area = 1,118,022km^2)

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
Abidjan Convention and Protocols	8	32	D
CECAF	8	100	C
COMHAFAT	5	100	C
ICCAT	1	100	C
SRFC	24	33	D

The extent of country membership in these bodies and instruments for the Canary Current LME is shown in Table 3.

Table 3. Country membership in marine agreements relevant to the Canary Current LME

LME coastal countries	Agreement							
	Abidjan Convention	Abidjan – Emergency Protocol	Abidjan-LBSA Protocol[2]	PRCM[3]	COMHAFAT	CECAF	SRFC	ICCAT
Morocco	N	N	N	N	B	C	N	B
Mauritania	B	B	B	C	B	C	B	B
Senegal	B	B		C	B	C	B	B
Guinea-Bissau	B	B		C	B	C	B	
Spain – Canary I.	N	N	N	N	N	C	N	
The Gambia	B	B	B	C	B	C	B	

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2 Not Yet in Force

[3] Also Guinea and Sierra Leone

Cape Verde				C	B	C	B	B
% engagement	80	80	40	100	100	100	100	57

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The arrangements for individual issues are shown in Tables 4 a-d. These are summarized in table 5

Table 4a: Canary Current LME[1] – Transboundary arrangement for fisheries - small pelagic resources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SRFC Coordinating Committee	LME	3	CCLME Project	• SRFC does not include Morocco so cannot adequately manage stocks shared with this country • Area of responsibility extends beyond CCLME to EEZ of Cape Verde, Guinea and Sierra Leone • CECAF covers: ○ EEZs of all countries of the CCLME ○ EEZs of all countries of the GCLME ○ EEZs of Madeira (Portugal) and Canary Islands (Spain) ○ Adjacent High Seas • While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to SRFC whose decisions are not binding either. • For SRFC member countries. CECAF assists with non SRCF member countries • Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,
Policy decision-making	SRFC Conference of Ministers ATLAFCO for broader coordination outside CCLME Region	LME	2		
Planning analysis and advice	SRFC Coordinating Committee CECAF Scientific Sub-Committee with Working Group for Small Pelagics	LME	3		
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	LME	2		
Implementation	SRFC Coordinating Committee Countries	LME/ National	1		
Review and evaluation	CECAF Scientific Sub-Committee	LME	2		
Data and information	CECAF Scientific Sub-Committee with Working Group for Small Pelagics Countries	LME	2	CCLME Project Partner countries and organisations provide support (e.g. Russia, EU)	
Overall total and % completeness >>			15/21= 71%		

Table 4b: Canary Current LME – Transboundary arrangement for fisheries - demersal finfish and shrimps					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SRFC Coordinating Committee	LME	3	CCLME Project	• SRFC does not include Morocco so cannot adequately manage stocks shared with this country • Area of responsibility extends beyond CCLME to EEZ of Cape Verde, Guinea and Sierra Leone • How does its responsibility relate to ATLAFCO? • CECAF covers: o EEZs of all countries of the CCLME o EEZs of all countries of the GCLME o EEZs of Madeira (Portugal) and Canary Islands (Spain) o Adjacent High Seas • While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to SRFC whose decisions are not binding either. • For SRFC member countries. CECAF assists with non SRCF member countries • Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,
Policy decision-making	SRFC Conference of Ministers	LME	2		
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Demersal Species	LME	3		
Planning decision-making	CECAF	LME	2		
Implementation	SRFC Coordinating Committee Countries, CECAF Technical Working Group	LME/ national	1		
Review and evaluation	CECAF Scientific Sub-Committee Working Group for Demersal Species	LME	2		
Data and information	CECAF Scientific Sub-Committee Working Group for Demersal Species Countries	LME	2	Partner countries and organisations provide support (e.g. Russia, EU)	
Overall total and % completeness >>			15/21 = 71%		

Table 4c: Canary Current LME – Transboundary arrangement for fisheries - tuna					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3		• Only Cape Verde, Guinea, Morocco and Senegal are members of ICCAT • There is no regionally coordinated approach to ICCAT • There are stocks of small tunas occurring mainly within the LME for which ICCAT has a mandate but does little regarding management, other than catch monitoring (recreational fishing) • There are trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	LME	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4d: Canary Current LME – Transboundary arrangement for (a) Pollution – LBS (nutrients, sediments, pesticides) and MBS (hydrocarbons) and (b) biodiversity - General					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Abidjan Convention RCUUNEP contribute	Supra-LME	1	CCLME Project, IUCN, PRCM	• According to the Convention all the above issues can be dealt with by this one arrangement, although sub-processes will be needed for each issue. • The Abidjan Convention includes the majority of GCLME countries (14 of 16). • It indicates that it will seek to address issues in collaboration with the GCLME Project, but the mode of interaction does not appear to be formal • This arrangement will be strengthened when the 2012 LBS Protocol comes into force Biodiversity • issues appear to be fully covered by the Abidjan Convention although only MPAs are mentioned in this regard rather than biodiversity specific measures • There is a manatee program that is species specific. Habitat modification • This issue which is raised as priority in the TDA is also broadly covered by the Abidjan Convention. • There is a mangrove charter under the PRCM and countries are seeking to change this to a Protocol under the Abidjan Convention
Policy decision-making	Abidjan Convention COP	Supra-LME	1		
Planning analysis and advice	Abidjan Convention RCU	Supra-LME	1		
Planning decision-making	Abidjan Convention COP	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Abidjan Convention RCU	Supra-LME	1		
Data and information	Abidjan Convention RCU/countries	Supra-LME	1		
Overall total and % completeness >>			7/21 = 33%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Biodiversity - alien invasive species

There are apparently multiple sources of the perceived threat, e.g. ballast water, introductions from aquaculture, introductions from aquaria. This is a rather specific issue that seems to have been included with pollution in the TDA for want of a more appropriate location. However, it is an issue of serious concern that probably needs its own arrangement within the Abidjan convention as it does not fit under an existing arrangement.

Pollution - Changing salinity upstream of river mouths

This issue appears to be related to water extraction upstream in rivers. It would appear to be a complex issue, with components of habitat degradation, including loss of, or changes in, coastal wetlands with the primary transboundary effect being on marine fisheries through loss of nursery habitat?

Table 5: Canary Current LME governance architecture - System summary[ii]

IW category: LME	**Countries:** Morocco, Mauritania, Senegal, Guinea-Bissau, Spain – Canary Islands, The Gambia, Cape Verde		**System name:** Canary Current		**Region:** Eastern Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - small pelagic resources	8		71		Morocco with 46% of the area of the LME is not a part of the SRCF
Fisheries - demersal finfish and shrimps	8		71		
Fisheries - tuna	8		81		ICCAT is responsible for these species Atlantic Ocean-wide
Pollution - LBS	8		33		The Abidjan Convention LBS Protocol is not yet in force
Pollution - MBS	8		33		
Biodiversity- general (includes mangrove and wetland degradation flagged in the TDA)	8		33		The agreement on mangrove conservation is being promoted as a protocol to the Abidjan Convention
Biodiversity – alien invasive species	8		0		There is no arrangement, and one is needed
	System architecture completeness index >>		46%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 5a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 10 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)

Policy cycle stage	**Fisheries - small pelagic resources**	**Fisheries - demersal finfish and shrimps**	**Fisheries - tuna**	**Pollution – LBS and MBS**	**Biodiversity - general (mangroves and wetland)**
Policy analysis and advice	SRFC CC	SRFC CC	ICCAT	Abidjan Convention RCU	Abidjan Convention RCU
Policy decision-making	SRFC Conf of Ministers ATLAFCO	SRFC Conf of Ministers ATLAFCO	ICCAT	Abidjan Convention COP	Abidjan Convention COP
Planning analysis and advice	SRFC CC CECAF Scientific Sub-Committee	SRFC CC CECAF Scientific Sub-Committee	ICCAT	Abidjan Convention RCU	Abidjan Convention RCU
Planning decision-making	Session of CECAF	Session of CECAF	ICCAT	Abidjan Convention COP	Abidjan Convention COP
Implementation	SRFC CC Countries	SRFC CC Countries	ICCAT	Countries	Countries
Review and evaluation	CECAF Scientific Sub-Committee	CECAF Scientific Sub-Committee	ICCAT	Abidjan Convention RCU	Abidjan Convention RCU
Data and information	CECAF Scientific Sub-Committee	CECAF Scientific Sub-Committee	ICCAT	Abidjan Convention RCU/countries IUCN, UNEP,	Abidjan Convention RCU/countries IUCN, UNEP,

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	1	1	1	1	1	1	1	1
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	0	1	1	0.9
4 and 6	1	1	1	1	0	1	1	0.9
5 and 6	1	1	1	1	0	1	1	0.9
Average	0.3	0.3	0.3	0.3	0.1	0.3	0.3	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this LME, integration across the arrangements for the six issues is consistently low with 0.2 out of a possible 1.

While the potential country membership of the arrangements for fisheries in areas under national jurisdiction is a good fit to the LME, the absence of Morocco (whose EEZ comprises 46% of the LME), from the SRFC, results in a substantial governance gap for resources that extend into its waters. This may be somewhat moderated by its involvement in CECAF and COMHAFAT which deal with technical and policy issues respectively.

The fact that decisions taken in CECAF and SRFC are not binding, seriously weakens these arrangements. Also, because implementation and monitoring of ICCAT decisions are solely the responsibility of countries, this seriously weakens these arrangements.

The Abidjan Convention is currently a relatively weak arrangement for pollution and biodiversity, as there are no protocols to give effect to its intent in these areas. Furthermore, the convention area does not extend to Mauritania and Morocco, and therefore only covers half of the LME.

While there appears to be potential for good integration of fisheries issues for resources within national jurisdiction, through the COMHAFAT, CECAF and SRFC, these do not appear to be well integrated with tuna fisheries under ICCAT.

There is also the potential for integration of pollution and biodiversity issues under the Abidjan Convention. However, as noted above the convention area only covers half of the LME.

There does not appear to be any organisation other than COMHAFAT that has the geographical coverage to integrate and coordinate across the full range of issues required for EBM. COMHAFAT also has membership of all coastal countries in this LME. While COMHAFAT is strictly a fisheries organization, an EAF as defined by FAO would include attention to pollution and biodiversity issues connected with fisheries.

3 Conclusions

In this LME, the two arrangements for fisheries (SRFC and CECAF) in the areas within national jurisdiction are closely connected. So are the two arrangements for pollution and biodiversity that fall under the Abidjan Convention. However neither of these pairs appears to be integrated with each other or with the tuna arrangement. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Canary Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Canary Current LME	Completeness	Integration	Engagement
	46%	0.2	80%

4 References

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Caribbean Sea LME

1 The system to be governed

The system is the Caribbean Sea LME. This includes the marine waters of the countries shown in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter XV-49), so a review is not provided here. This assessment is also informed by the TDAs (Heileman 2011, Phillips 2011, Mahon et al 2011).

Table 1. Percentage of Caribbean LME area taken up by the EEZ of each country and the High Seas (area = 3,246,144km2)

Country	Percent of LME area	Country	Percent of LME area
Antigua and Barbuda	0.1	Netherlands Antilles (Aruba, Bonaire, Curacao, St. Eustatius)	2.1
Bahamas	7.2	Netherlands (St. Maarten)	0.4
Barbados	0.4	Nicaragua	2.0
Belize	1.1	Panama	4.4
Colombia	14.4	Saint Kitts and Nevis	0.3
Costa Rica	0.8	Saint Lucia	0.5
Cuba	9.4	St. Vincent and the Grenadines	1.1
Dominica	0.5	Trinidad and Tobago	0.9
Dominican Republic	6.5	United Kingdom (Anguilla)	<0.1
France (Guadeloupe and Martinique)	1.2	United Kingdom (British Virgin Islands)	<0.1
France (St. Martin)(St. Barthelemy)	<0.1	United Kingdom (Cayman Islands)	3.6
Grenada	0.8	United Kingdom (Montserrat)	0.2
Guatemala	<0.1	United Kingdom (TCI)	1.2
Haiti	3.8	Puerto Rico and US Virgin Islands	4.3
Honduras	7.3	United States	0.5
Jamaica	7.5	Venezuela	13.7
Colombia - Jamaica	0.6	High Seas	0.6
Mexico	2.7		

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDAs (Phillips 2011, Heileman 2011, Mahon et al 2011):

- Unsustainable fisheries
- Habitat modification
- Pollution

Following is a list showing the three broad issues and their nested sub-issues, each of which is considered to require a separate governance arrangement within the Regional Governance Framework.

- Unsustainable use of the fisheries resources
  - Unsustainable use of reef fisheries ecosystems – reef fishes and other biodiversity
  - Unsustainable use of lobster fisheries ecosystems
    - Central America – North Central/South Central stocks (Groups II and III)
    - Northern stock (Group I)
    - Southern stock (Group IV)
  - Unsustainable use of pelagic fisheries ecosystem
    - Large pelagics– coastal and oceanic
    - Eastern Caribbean flyingfish
- Marine pollution
  - Land-based sources of pollution
  - Marine based sources of pollution
- Coastal and marine habitat degradation and destruction (wetlands/mangroves)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).
   a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region which was also adopted in 1983 and entered into force on 11 October 1986;
   b. Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region which was adopted on 18 January 1990. The Protocol entered into force on 18 June 2000;
   c. Protocol Concerning Pollution from Land-Based Sources and Activities which was adopted on 6 October 1999. The Protocol entered into force on 13 August 2010.
2. Caribbean Regional Fisheries Mechanism (CRFM)

3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
4. Latin American Organization for Fisheries Development (OLDEPESCA)
5. Organization for Central American Fisheries and Aquaculture Sector (OSPECA)
6. Western Central Atlantic Fisheries Commission (WECAFC)
7. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
8. The Strategic Action Programme for the Sustainable Management of the Shared Living Marine Resources of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+ SAP)
9. Caribbean Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Caribbean Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Caribbean Sea LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
Cartagena Convention and Protocols	49	100	C
CRFM	42	26	D
ICCAT	3	100	C
OLDEPESCA	27	58	D
OSPESCA	37	24	D
WECAFC	18	100	C
IAC		100	C
CLME+SAP			

The extent of country membership in these bodies and instruments for the Caribbean LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Caribbean Sea LME

Coastal countries in the LME	Agreements									
	Cartagena									
	Convention	Oil Spills Protocol	LBS Protocol	SPAW Protocol	CRFM	ICCAT	OLDEPESCA	OSPESCA	WECAFC	IAC
Antigua and Barbuda	B	B	B		B		N	N	C	
Bahamas	B	B	B		B		N	N	C	
Barbados	B	B		B	B	B		N	C	
Belize	B	B	B	B	B	B	B	B	C	B
Colombia	B	B		B	N			N	C	
Costa Rica	B	B			N		B	B		B
Cuba	B	B		B	N		B	N	C	
Dominica	B	B			B		N	N	C	
Dominican Republic	B	B	B	B	N			B	C	
France	B	B	B	B	N	B	N	N	C	
Grenada	B	B	B	B	B			N	C	
Guatemala	B	B			N	B		B	C	B
Haiti	B				B			N	C	
Honduras	B				N	B	B	B	C	B
Jamaica	B	B			B			N	C	
Mexico	B	B		C	N	B	B	N	C	B
Netherlands[2]	B	B		B	N		N	N		
Nicaragua	B	B			N	B	B	B	C	C
Panama	B	B	B	B	N	B		B	C	B
St. Kitts and Nevis	B	B			B		N	N	C	
Saint Lucia	B	B	B	B	B		N	N	C	
St. Vincent/Grenadines	B	B		B	B	B	N	N	C	
Trinidad and Tobago	B	B	B	B	B	B		N	C	
UK[3]	B	B			B	B	N	N	C	
UK (Montserrat)					B	B	N	N	C	
United States[4]	B	B	B	B	N	B	N	N	C	B
Venezuela	B	B		B	N	B	B	N	C	B
% engagement	93	85	37	52	100	52	44	100	92	30

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[2] Netherlands Antilles including St. Maarten, Aruba, Bonaire, Curacao, St. Eustatius
[3] United Kingdom Overseas Territories including Anguilla, British Virgin Islands, Cayman Islands, Turks and Caicos,
[4] This also includes two US territories: Puerto Rico and US Virgin Islands

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-i. These are summarized in Table 5.

Table 4a: Caribbean Sea LME[i] – Transboundary arrangements for fisheries - EEZ

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CRFM Secretariat CRFM Forum	Sub-LME	3	OSPESCA WECAFC OLDEPESCA OECS	The CRFM is responsible for fisheries in the waters of CARICOM countries, and for representing these countries with external for fishing interests
Policy decision-making	CRFM Ministerial Council	Sub-LME	1		
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	Sub-LME	2		
Planning decision-making	CRFM Ministerial Council	Sub-LME	1		
Implementation	CRFM Secretariat CPs	Sub-LME National	1		
Review and evaluation	CRFM Secretariat CRFM Forum	Sub-LME	2		
Data and information	CRFM Secretariat	Sub-LME	2		
Overall total and % completeness >>			12/21 = 57%%		

Table 4b: Caribbean Sea LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3	OLDEPESCA CPPS	OSPESCA members includes 6 of the 10 countries in the LME that are part of the Central American isthmus and as such, does not include Mexico nor the three South American countries of Colombia, Peru and Ecuador. Furthermore, none of the Central American countries are members of CPPS due to its area of competence How do the countries in the LME reconcile overlaps this apparent division of the LME by arrangements when they technically address the same fisheries but cover different parts of the LME? For countries who are members of more than one agreement, what is the current relationship between their interactions with each organization?
Policy decision-making	OSPESCA - Council of Ministers	Supra-LME	2		
Planning analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3		
Planning decision-making	OSPESCA Member countries	Supra-LME National	2		
Implementation	OSPESCA Member Countries	National	2		
Review and evaluation	OSPESCA - Council of Ministers	LME	2		
Data and information	OSPESCA Member Countries OSPESCA Secretariat	National Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4c: Caribbean Sea LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WECAFC Scientific Advisory group, and WGs. Commission	Supra-LME	2	CRFM OSPESCA OLDEPESCA OECS	
Policy decision-making	WECAFC Commission	Supra-LME	0		
Planning analysis and advice	Working Groups and Partners	Supra-LME	2		
Planning decision-making	WECAFC Commission	Supra-LME	0		
Implementation	Countries Partner Organizations	National LME	0		
Review and evaluation	Working Groups and Commission	Sub-LME	1		
Data and information	Countries, FAO HQ and Working Groups	National Supra-LME	1		
Overall total and % completeness >>			6/21 = 29%%		

Table 4d: Caribbean LME – Transboundary arrangements for fisheries - general					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	WECAFC	US is not a member of OLDEPESCA How significant is OLDEPESCA to the members of this LME?
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4e. Caribbean Sea LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3	The Billfish Foundation (TBF), International Game Fish Association (IGFA) GCFI	Mexico and US are members but not Cuba
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4f. Caribbean Sea LME – Transboundary arrangement for Pollution – LBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	LBS Scientific and Technical Advisory Committee (STAC)	Supra-LME	3		To what extent are the Cartagena Convention and its protocols significant agreements in the arrangement for Pollution and Biodiversity in the LME?
Policy decision-making	IGM LBS CoP	Supra-LME	1		
Planning analysis and advice	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Supra-LME	2		
Planning decision-making	LBS CoP	Supra-LME	1		
Implementation	Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	LBS STAC	Supra-LME	2		
Data and information	Countries RCUs RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4g. Caribbean Sea LME – Transboundary arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Supra-LME	3	MEXUS -Gulf	The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico.
Policy decision-making	Cartagena Conv. – IGM, Oil Spill CoP	Supra-LME	1		
Planning analysis and advice	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC),RAC/REMPEITC-Carib	Supra-LME	2		
Planning decision-making	Cartagena Conv. - Oil Spill CoP	Supra-LME	1		
Implementation	Cartagena Conv. – Countries, RCUs,RACs	National Supra-LME	2		
Review and evaluation	Cartagena Conv. - Oil Spill STAC	Supra-LME	2		
Data and information	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4h. Caribbean Sea LME – Transboundary arrangement for Biodiversity – General (PAs, Habitat alteration and depleted non-commercial species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	Supra-LME	3	TNC, CoML	Cuba and US are parties to the SPAW Protocol but not Mexico.
Policy decision-making	SPAW IGM and CoP	Supra-LME	2		
Planning analysis and advice	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	Supra-LME	2		
Planning decision-making	SPAW CoP	Supra-LME	2		
Implementation	SPAW Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	SPAW STAC	Supra-LME	2		
Data and information	SPAW Countries RCUs RACs	Supra-LME	2		
Overall total and % completeness >>			15/21 = 71%		

Table 4i: Caribbean Sea LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both USA and Mexico are parties to the IAC, but not Cuba
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Caribbean Sea LME governance architecture - System summary[ii]					
IW category: LME	**Countries:**		**System name:** Caribbean Sea LME		**Region:** WC Atlantic
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ	27		57		CRFM
Fisheries – EEZ	27		76		OSPECA
Fisheries – EEZ	**27**		29		WECAFC
Fisheries – EEZ	27		43		OLDESPECA
Fisheries - HMS	27		80		
Pollution - LBS	27		62		
Pollution - MBS	27		62		
Biodiversity – General	27		71		
Biodiversity - Specific (sea turtles)	27		57		
	System architecture completeness index >>		60%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)									
Policy cycle stage	**Fisheries – EEZ (CRFM)**	**Fisheries – EEZ (OSPESCA**	**Fisheries – EEZ (WECAFC)**	**Fisheries – EEZ (OLDEPESCA)**	**Fisheries - HMS**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity – General**	**Biodiversity - Specific (sea turtles)**
Policy analysis and advice	CRFM Secretariat CRFM Forum	OSPESCA – Directors of Fisheries and Aquaculture Commission	WECAFC SAG, and WGs. Commission	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS	LBS STAC	Cartagena - OSP STAC, OSP COP	Cartagena SPAW Protocol STAC SPAW COP	IAC Consultative and Scientific Committees
Policy decision-making	CRFM Ministerial Council	OSPESCA - Council of Ministers	WECAFC Commission	OLDEPESCA - Council of Ministers	ICCAT Commission	IGM LBS CoP	Cartagena – IGM, OSP CoP	SPAW IGM and CoP	IAC Consultative Committee and CoP
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	OSPESCA – Directors of Fisheries and Aquaculture Commission	Working Groups and Partners	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS and Species Panels	LBS STAC CIMAB-RAC-Cuba IMA-RAC-Trinidad	Cartagena Conv. – OSP STAC,RAC/REMPEITC-Carib	SPAW STAC RAC-SPAW Guadeloupe	IAC Consultative and Scientific Committees
Planning decision-making	CRFM Ministerial Council	OSPESCA Member countries	WECAFC Commission	Countries	ICCAT Commission	LBS CoP	Cartagena Conv. - Oil Spill CoP	SPAW CoP	IAC CoP
Implementation	CRFM Secretariat CPs	OSPESCA Member Countries	Countries Partner Organizations	Countries	Countries	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs,RACs	SPAW Countries RCUs RACs	IAC Countries
Review and evaluation	CRFM Secretariat CRFM Forum	OSPESCA - Council of Ministers	Working Groups and Commission	OLDEPESCA - Council of Ministers	CMMCC)	LBS STAC	Cartagena Conv. - Oil Spill STAC	SPAW STAC	IAC Countries
Data and information	CRFM Secretariat	OSPESCA Member Countries OSPESCA Secretariat	Countries, FAO HQ and Working Groups	Countries OLDEPESCA – Secretariat	PWG	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs, RACs	SPAW Countries RCUs RACs	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	1	1	1	0	0	0	0	0.4
1 and 3	0	0	1	0	1	1	1	0.6
1 and 4	0	0	0	0	0	0	0	-
1 and 5	0	0	0	0	0	0	0	-
1 and 6	0	0	0	0	0	0	0	-
1 and 7	0	0	0	0	0	0	0	-
1 and 8	0	0	0	0	0	0	0	-
1 and 9	0	0	0	0	0	0	0	-
2 and 3	0	0	1	0	1	1	1	0.6
2 and 4	0	0	0	0	0	0	0	-
2 and 5	0	0	0	0	0	0	0	-
2 and 6	0	0	0	0	0	0	0	-
2 and 7	0	0	0	0	0	0	0	-
2 and 8	0	0	0	0	0	0	0	-
2 and 9	0	0	0	0	0	0	0	-
3 and 4	0	0	0	0	0	0	0	-
3 and 5	0	0	0	0	0	0	0	-
3 and 6	0	0	0	0	0	0	0	-
3 and 7	0	0	0	0	0	0	0	-
3 and 8	0	0	0	0	0	0	0	-
3 and 9	0	0	0	0	0	0	0	-
4 and 5	0	0	0	0	0	0	0	-
4 and 6	0	0	0	0	0	0	0	-
4 and 7	0	0	0	0	0	0	0	-
4 and 8	0	0	0	0	0	0	0	-
4 and 9	0	0	0	0	0	0	0	-
5 and 6	0	0	0	0	0	0	0	-
5 and 7	0	0	0	0	0	0	0	-
5 and 8	0	0	0	0	0	0	0	-
5 and 9	1	1	1	1	1	1	1	1.0
6 and 7	1	1	1	1	1	1	1	1.0
6 and 8	1	1	1	1	1	1	1	1.0
6 and 9	0	0	0	0	0	0	0	-
7 and 8	1	1	1	1	1	1	1	1.0
7 and 9	0	0	0	0	0	0	0	-
8 and 9	0	0	0	0	0	0	0	0.4
Average	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1.

3 Conclusions

Three arrangements for fisheries in this LME - CRFM, OSPESCA and WECAFC - are connected. OLDEPESCA is minimally connected within the LME. None of the fisheries arrangements are connected with ICCAT. The arrangements for pollution and biodiversity that fall under the Cartagena Convention are connected via the CEP, but do not appear well connected with fisheries or with the IAC. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Caribbean Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Caribbean Sea LME	Completeness	Integration	Engagement
	60%	0.2	68%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Celtic-Biscay Shelf LME

1 The system to be governed

The system is the Celtic-Biscay Shelf LME. It is situated in the Northeast Atlantic Ocean, and covers an area of about 756,000 km^2. This LME includes the marine waters of France, Ireland and the United Kingdom as indicated in Table 1. All coastal countries in this LME are within the European Union.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 37), so a review is not provided here.

Table 1. Percentage of Celtic-Biscay Shelf LME area taken up by the EEZ of each country and the High Seas (area = 756,000 km^2)

Country (N to S)	Percent of LME area
France	23.9
Ireland	36.6
United Kingdom including Guernsey and Jersey	36.0
High Seas	3.5

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 37 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - intensively exploited or depleted stocks (mollusks, seaweed, herring, redfish, sand eel and mackerel)
- Biodiversity
  - alterations to the seabed; introduction of non-indigenous species
- Pollution
  - (LBS) eutrophication (sewage, agriculture, and fish farming); microbiological contamination threats from industrial discharges, inorganic and organic compounds, mercury (associated with paper mill industries), and PAHs
- Pollution
  - (MBS) threats from shipping accidents, pollution and oil spills

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. International Council for the Exploration of the Sea (ICES)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)

4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
5. North-East Atlantic Fisheries Commission (NEAFC)
6. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
7. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
8. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
9. European Union Common Fisheries Policy (CFP)
10. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Celtic-Biscay Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Celtic-Biscay Shelf LME (area = 755,469 km^2)

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	4	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	4	100	C
North-East Atlantic Fisheries Commission (NEAFC)	6	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	5	100	C
Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)	45	77	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	36	100	C
European Union Common Fisheries Policy (CFP)	20	95	D
European Union Maritime Policy	20	95	D

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Celtic-Biscay Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Celtic-Biscay Shelf LME

Coastal countries in the LME	Agreements								
	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	Bonn	ASCOBANS	EU-CFP
France	B	B				B	B	B	B
Ireland		B				B	B	C	B
United Kingdom including Guernsey, Jersey	B	B				B	B	B	B
% engagement	67	100	0	0	0	100	100	67	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-h. They are summarised in table 5.

Table 4a: Celtic-Biscay Shelf LME[i] – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Celtic-Biscay Shelf LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Celtic-Biscay Shelf LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Celtic-Biscay Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: Celtic-Biscay Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3		
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Celtic-Biscay Shelf LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4g: Celtic-Biscay Shelf LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4h: Celtic-Biscay Shelf LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Celtic-Biscay Shelf LME governance architecture - System summary[ii]					
IW category: LME		**Countries:** France, Ireland, United Kingdom	**System name: :** Celtic-Biscay Shelf LME		**Region:** North East Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Fisheries - EEZ	3		90%		CFP
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution – MBS	3		38%		Bonn
Biodiversity – small cetaceans	3		62%		ASCOBANS
	System architecture completeness index >>		74%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-h) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)									
Policy cycle stage	**Fisheries - Salmon**	**Fisheries – marine mammals**	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution – MBS**	**Pollution - MBS**	**Biodiversity - Specific**
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - PEMAS ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Bonn Agreement – Contracting Parties	ASCOBANS Advisory Committee
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Contracting Parties	ASCOBANS Advisory Committee
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO	Countries	Countries	Contracting Parties Scientific, Technical and	Countries OSPAR Commission Special	Countries OSPAR Commission Special	Contracting Parties	Contracting Parties

		Control Scheme for Hunting			Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Studies OSPAR Secretariat	Studies OSPAR Secretariat		
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	Commission STECF	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Meeting of the Parties	Meeting of the Parties
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Contracting Parties Commission STECF Advisory Councils	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Contracting Parties	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.03 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Given that all coastal countries in this LME are within the European Union, the EU CFP may provide an additional level of integration among fisheries bodies and between fisheries and environmental issues. This LME has been assigned an overall integration score of 1.0 due to the presence of the European Union Maritime Policy with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Celtic-Biscay Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Celtic-Biscay Shelf LME	Completeness	Integration	Engagement
	74%	1.0	59%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Central Arctic LME

1 The system to be governed

The system is the Central Arctic LME. This LME is the largest of the Arctic LMEs. While the Arctic is made up of several large seas, it is essentially a semi-enclosed ocean shared by the surrounding countries. Out of a total of over 6 million km^2, the Central Arctic LME covers an area of about 3.3 million km^2 (Table 1)

This LME comprises essentially the deep basins of the Arctic Ocean with the Lomonosov Ridge separating the Eurasian basins from the Canada basin.

An overview of this LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009 (Chapter X-29: Arctic Ocean), so an individual review is not provided here. This assessment is also informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

Table 1. Percentage of Central Arctic LME area taken up by the EEZ of each country and the High Seas (area = 3,318,271 km^2)

Country	Percent of LME area
Canada	9.8
Denmark (Greenland)	6.7
Norway	2.4
Russia	15.0
High Seas	66.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
  - exploitation of sea mammals
- Biodiversity
  - endangered marine species (walruses and whales)
- Pollution
  - land-based sources of pollution, particularly POPs and heavy metals, shipping, dumping and the exploitation of offshore hydrocarbon.
- Climate Change
  - Increased warming is expected; significant impact from climatic variability

2.2 Identify arrangements for each transboundary issue

Regional governance is important because of the unique character of this LME. As such, the key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Agreement on the Conservation of Polar Bears (ACPB)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. International Council for the Exploration of the Sea (ICES)
7. North-East Atlantic Fisheries Commission (NEAFC)
8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical areas of coverage of these bodies and instruments overlap the Central Arctic LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Central Arctic LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	18.1	100	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	18	D
International Council for the Exploration of the Sea (ICES)	4	18	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	3	18	D
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	3	18	D
North-East Atlantic Fisheries Commission (NEAFC)	4	15	D
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)	4	16	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

The extent of country membership in these bodies and instruments for the Central Arctic LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Central Arctic LME

LME coastal countries	Agreement							
	AC	ICCAT	NAMMCO	NASCO	ICES	NEAFC	OSPAR	ACPB
Canada	C	B		B	B	N		B
Denmark (Greenland)	C		B	B		B	B	
Norway	C	B	B	B	B	B	B	B

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Russia	C	B		B	B	B		B
% engagement	100	75	50	100	75	100	25	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The arrangements for individual issues are shown in Tables 4 a-g. These are summarized in table 5.

Table 4a: Central Arctic LME[i] – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Canada is a non-cooperating member of NEAFC. While NEAFC covers part of this LME, how important exactly is this arrangement to the Central Arctic LME? ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b. Central Arctic LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		While ICCAT covers part of this LME, is it a critical arrangement for the LME? Might it increase with time due to climate change?
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4c: Central Arctic LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3	ICES	All countries are members of NASCO ICES named in NASCO to provide scientific advice While NASCO covers part of this LME, is it a critical arrangement for the LME? Might it increase with time due to climate change?
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4d: Central Arctic LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals (Polar Bears)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	All 4 coastal states are members of ACPB although Russia has only signed, not ratified The arrangement only covers some 18% of the eastern part of the LME
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Table 4e: Central Arctic LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	Norway and Denmark (through Greenland and Faroe islands) are members of NAMMCO but Russia and Canada are not.
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4f: Central Arctic LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council	Canada and Russia are not members of OSPAR The arrangement only covers some 15% of the LME
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4g: Central Arctic LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	All countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups;Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Central Arctic LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Denmark, Norway, Russia**	**System name: Barents Sea**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – general	4		86%		
Fisheries – large pelagics (tunas and tuna-like)	4		86%		
Fisheries – specific (salmon)	4		57%		
Pollution (LBS)	4		90%		
Pollution (LBS)	4		67%		
Pollution (MBS)	4		67%		
Pollution (MBS)	4		90%		
Biodiversity – General	4		90%		
Biodiversity - General	4		67%		
Fisheries – Specific (Marine Mammals)	4		71%		
Biodiversity – Specific (Polar Bears)	4		38%		
	System architecture completeness index >>		74%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

The impacts associated with climate change in the Arctic are not specifically addressed as they are manifested in the transboundary fisheries, pollution and biodiversity concerns of the region.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	**Fisheries - General**	**Fisheries - HMS**	**Fisheries - Specific**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Fisheries Specific Marine Mammals**	**Biodiversity – Polar Bears**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	ACPB – IUCN Polar Bear Specialist Group and Country experts	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	OSPAR Commission	OSPAR Commission	OSPAR Commission	NAMMCO Council	ACPB-Countries	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat	OSPAR – Eutrophication Strategy Hazardous	OSPAR - Offshore Industry Strategy	OSPAR - Biodiversity and Ecosystem	NAMMCO Management Committee and	ACPB – IUCN Polar Bear Specialist	Arctic Council - Arctic Contaminants Action	Arctic Council - Emergency preparedness, Prevention	Arctic Council Conservation of Arctic Flora and Fauna;

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	**Fisheries - General**	**Fisheries - HMS**	**Fisheries - Specific**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Fisheries Specific Marine Mammals**	**Biodiversity – Polar Bears**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	Management and Science (PEMAS) ICES		ICES	Substances Radioactive Substances Committees and Working Groups	Committee and Working Groups	Committee and Working Groups	Scientific Committee	Group and Country experts	Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	OSPAR Commission	OSPAR Commission	OSPAR Commission	NAMMCO Council	ACPB Countries	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	ACPB Countries	Countries	Countries	Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	**Fisheries - General**	**Fisheries - HMS**	**Fisheries - Specific**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Fisheries Specific Marine Mammals**	**Biodiversity – Polar Bears**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	NAMMMCO Council Committee on Inspection and Observation ACPB - IUCN Polar Bear Specialist Group	ACPB - IUCN Polar Bear Specialist Group	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	NAMMCO and ACPB Countries NAMMCO Secretariat ACPB – IUCN Polar Bear Specialist Group and Country experts	ACPB – IUCN Polar Bear Specialist Group and Country experts	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	1	1	1	0.71
4 and 6	0	1	0	1	1	1	1	0.71
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0

5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
6 and 11	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
9 and 10	0	1	0	1	0	1	1	0.57
9 and 11	0	1	0	1	0	1	1	0.57
10 and 11	0	1	0	1	0	1	1	0.57
Average	0.02	0.11	0.02	0.11	0.05	0.11	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eleven issues is 0.1 out of a possible 1.

3 Conclusions

None of the three fisheries arrangements (NEAFC, ICCAT and NASCO) appear to be integrated while the three arrangements for pollution and biodiversity (NAMMCO, ACPB and OSPAR) appear to have the Arctic Council as an integrating arrangement for one set of issues and OSPAR for a similar set of issues. However, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent. It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak. As such, the LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Central Arctic LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Central Arctic LME	Completeness	Integration	Engagement
	73%	1.0	78%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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PAME. 2013. Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map. http://www.pame.is/images/Documents/PAME_revised_LME_map_with_explanatory_text_15_Aug_2013_-_Vefur.pdf

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the East Bering Sea LME

1 The system to be governed

The system is the East Bering Sea LME. The LME is bounded by the Bering Strait to the North, by the Alaskan Peninsula and Aleutian Island chain to the South, and by a coastline to the east that is thousands of miles in length. Jurisdiction over the marine waters is shared by the US and Russia, with some 171,000 km^2 or just over 13 % being high seas (Table 1.)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009 (Chapter XIV-45), so a review is not provided here.

Table 1. Percentage of East Bering Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,296,019 km^2)

Country	Percent of LME area
US	84.6
Russia	2.0
High Seas	13.4

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 45 (Sherman and Hempel, 2009). While the LME appears to have minimal transboundary issues in need of attention, the following have been highlighted

- Fisheries
  - declining Chinook and chum salmon stocks due to overfishing, bycatch and loss of freshwater spawning and rearing habitat
  - IUU fishing, especially for Pollock and Halibut in Bering Sea donut hole
- Pollution
  - LBS (logging, mining and oil and gas development)
  - increasing levels of toxic contaminants by long-range air and oceanic transport in marine mammals
- Biodiversity
  - threatened Steller sea lion population
  - habitat modification resulting from logging, mining and oil and gas development

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)
2. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
3. International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery (IPHC)
4. Convention on Conservation and Management of Pollock Resources in the Central Bering Sea (CCBSP)
5. The North Pacific Marine Science Organization (PICES)
6. Agreement on the Conservation of Polar Bears (ACPB)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the East Bering Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the East Bering Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Convention on Conservation and Management of Pollock Resources in the Central Bering Sea (CCBSP)	100	11	B
International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery (IPHC)	9	56	D
Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)	1	11	D
The North Pacific Marine Science Organization (PICES)	5	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	<1	31	D
Arctic Council	7.1	100	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

The extent of country membership in these bodies and instruments for the East Bering Sea LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the East Bering Sea LME							
Coastal countries in the LME	Agreements						
	CCBSP	IPHC	NPAFC	PICES	WCPFC	AC	ACPB
United States	B	B	B	B	B	C	B
Russia	B	N	B	B		C	B
% engagement	100	100	100	100	50	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed							

While the area of competence of the WCPFC covers some 33% of the LME, an assessment of this arrangement was not completed for this arrangement due to the absence of a tuna fishery in the LME (Sherman and Hempel 2009, Chapter XIV-45)

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in table 5

Table 4a: East Bering Sea LME[1] – Transboundary Arrangements for Fisheries – specific (anadromous species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3	PICES	
Policy decision-making	NPAFC - Commission	LME	1		
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3		
Planning decision-making	NPAFC - Commission	LME	1		
Implementation	Countries	National	0		
Review and evaluation	NPAFC - Committee on Enforcement	LME	3		
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4b: East Bering Sea LME – Transboundary Arrangements for Fisheries – Specific (High Seas Pollock)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CCBSP – Scientific and Technical Committee	LME	3	PICES?	All decisions of substance are made by consensus, all other decisions are made by simple majority
Policy decision-making	CCBSP - CoP	LME	1		
Planning analysis and advice	CCBSP – Scientific and Technical Committee	LME	3		
Planning decision-making	CCBSP - CoP	LME	1		
Implementation	Countries	National	3		
Review and evaluation	CCBSP- CoP	LME	2		
Data and information	CCBSP – Scientific and Technical Committee Countries	LME/National	3		
Overall total and % completeness >>			16/21 = 76%		

Table 4c: East Bering Sea LME – Transboundary Arrangements for Fisheries – Specific (Halibut)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3	PICES	Russia is not a member
Policy decision-making	IPHC - Commission	LME	3		
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3		
Planning decision-making	IPHC - Commission	LME	3		
Implementation	Countries	National	2		
Review and evaluation	IPHC – Conference Board	LME	3		
Data and information	IPHC – Conference Board	LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4d:East Bering Sea LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	Given the geographic location of the LME, how important is this arrangement? Note that Sherman and Hempel (2009) show some tuna and bill fish catch in the LME hence the arrangement was included.
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	Countries WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4e: East Bering Sea LME – Transboundary Arrangement for Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC) PICES?	All countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups;Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4f: East Bering Sea LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	Both coastal states are members of ACPB although Russia has only signed, not ratified The arrangement only covers some 18% of the eastern part of the LME
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Table 5: East Bering LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: United States, Russia**		**System name: East Bering**		**Region: North East Pacific**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – Specific (anadromous species)	2		62%		
Fisheries – Specific (High Seas Pollock)	2		76%		
Fisheries – Specific (Halibut)	2		95%		
Fisheries – HMS (Tuna and tuna-like)	2		90%		
Pollution (LBS)	2		67%		
Pollution (MBS)	2		67%		
Biodiversity – General	2		67%		
Biodiversity - Specific	2		38%		
	System architecture completeness index >>		70%		<< System priority for intervention

2.2.2 Issues mentioned but not addressed above:

There are no specific regional agreements relating to biodiversity, habitat modification, land-based sources or marine-based sources of pollution other than the voluntary Arctic Council. This is hardly unlikely given the bulk of the LME is primarily under USA jurisdiction and arrangements relating to these issues would focus on US federal or state (Alaska) legislation.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	**Fisheries – Specific (Anadromous)**	**Fisheries – Specific (Pollock)**	**Fisheries - Specific (Halibut)**	**Fisheries - HMS**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific**
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	CCBSP – Scientific and Technical Committee PICES	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board. PICES	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts
Policy decision-making	NPAFC – Commission	CCBSP - CoP	IPHC - Commission	WCPFC Commission.	Arctic Council	Arctic Council	Arctic Council	ACPB- Countries
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	CCBSP – Scientific and Technical Committee PICES	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	**Fisheries – Specific (Anadromous)**	**Fisheries – Specific (Pollock)**	**Fisheries - Specific (Halibut)**	**Fisheries - HMS**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific**
			PICES					
Planning decision-making	NPAFC – Commission	CCBSP - CoP	IPHC - Commission	WCPFC Commission.	Arctic Council	Arctic Council	Arctic Council	ACPB Countries
Implementation	Countries	Countries	Countries	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	ACPB Countries
Review and evaluation	NPAFC - Committee on Enforcement	CCBSP- CoP	IPHC – Conference Board	The Technical and Compliance Committee (TCC)	Arctic Council	Arctic Council	Arctic Council	ACPB - IUCN Polar Bear Specialist Group
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	CCBSP – Scientific and Technical Committee Countries	IPHC – Conference Board	SPC OFP	Countries Secretariat	Countries Secretariat	Countries Secretariat	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	1	0	1	0	0	0	0	0.29
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	1	0	1	0	0	0	0	0.29
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	0	1	1	0.57
5 and 7	0	1	0	1	0	1	1	0.57
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	0	1	1	0.57
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.14	0.14	0..14	0.14	0	0.14	0.14	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.1 out of a possible 1.

3 Conclusions

The four fisheries arrangements (NPAFC, CCBSP, IPHC and WCPFC) are each unique, addressing specific types of fisheries. The only area for commonality appears to be in the form of scientific advice being provided with input from PICES in arrangements relating to halibut, Pollock and anadromous species. Additionally, the member countries are primarily responsible for implementation across all of the arrangements. However it is worth noting that the arrangement for highly migratory tunas appear to have little to no formal integration with the other fisheries arrangements.

The Arctic Council provides for some level of integration across pollution (LBS and MBS) and for biodiversity (general) in the part of the LME that is covered by the Arctic Council. However, overall, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the East Bering Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

East Bering Sea LME	Completeness	Integration	Engagement
	70%	0.1	93%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
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Data and information:
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2 = DI centrally coordinated, reviewed and shared[ix]
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End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

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[ii] Table notes:

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Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

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System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

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[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

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[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the East China Sea LME

1 The system to be governed

The system is the East China Sea LME bordered by the China mainland, northern coast of Taiwan, Japanese Archipelago, and southern coast of the Korean Peninsula (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009 (Chapter X-22), so a review is not provided here.

Table 1. Percentage of East China Sea LME area taken up by the EEZ of each country and the High Seas (area = 722,310 km^2)

Country	Percent of LME area
China	33.0
Disputed (conflict zone)	9.4
Japan	29.4
Joint Regime (Japan-Korea)	10.7
South Korea	11.7
Taiwan	5.4
High Seas	0.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) as follows:

- Fisheries
  - increase in exploitation of commercial stock
  - decline in major high value demersal fisheries (such as Croaker)
  - fisheries resources and aquaculture operations affected by HAB
- Pollution
  - LBS (nutrients, sediments and pesticides)
  - increase in frequency of major harmful algal blooms (HABs) with wide geographical distribution
  - MBS (hydrocarbons and heavy metal pollution)
- Biodiversity/Habitat Modification
  - unprecedented rapid industrial development and population growth altering coastal and nearshore habitat
  - dramatic reduction in mangrove wetland area

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. North Pacific Marine Science Organisation (PICES)

3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Partnerships in the Environmental Management for the Seas of East Asia (PEMSEA)
5. Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific (NOWPAP)
    a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
    b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
    c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
    d. Data and Information Network RAC- DINRAC, Beijing, China
6. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
7. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the East China Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the East China Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Asia Pacific Fisheries Commission (APFIC)	1	10	D
The North Pacific Marine Science Organization (PICES)	1	45	D
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	1	100	C
Partnerships in the Environmental Management for the Seas of East Asia (PEMSEA)			
Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific (NOWPAP)			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the East China Sea LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the East China Sea LME						
LME coastal countries	Agreement					
	APFIC	PICES	WCPFC	PEMSEA	NOWPAP	Dugong MOU
China	B	B	B	C	C	
Taiwan	N	N	N	N	N	N
Japan	B	B	B	C	C	
South Korea	B	B	B	C	C	
% engagement	100	100	100	100	100	0
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed						

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in table 5

Table 4a: East China Sea LME[i] – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	• None of the countries have ratified the WCPFC Agreement but China, Japan and Korea have signed. What the implications of this, if any, given that there is negligible high seas area in the LME? • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The FFA area of competence does not extend into the LME. How does this affect the role of the FFA in the WCPFC in the area of the LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: East China Sea LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC PICES	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: East China Sea LME – Transboundary arrangement for Pollution – LBS and MBS oil spills					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2	PEMSEA	CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: East China Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: East China Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: China, Taiwan, Japan, Korea**		**System name: East China Sea**		**Region: East Asia**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (Tuna and tuna-like)	4		90%		
Fisheries – EEZ	4		38%		
Pollution – LBS	4		38%		
Pollution - MBS	4		38%		
Biodiversity	4		0%		
Biodiversity – specific (dugong)	4		52%		CMS MOU
	System architecture completeness index >>		43%%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Concerns regarding coastal degradation of both the physical and biological (flora and fauna) coastal and near shore environment arising from increasing population were raised. While PEMSEA addresses integrated coastal issues, including biodiversity in the regions, it is a partnership and while its successes have been many, it does not have the status of a regional conventional so follow through by countries is voluntary.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-d)					
Policy cycle stage	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution - MBS**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP-RCU, CEARAC, MERRAC	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	NOWPAP-IGM	NOWPAP-IGM	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP-RCU, CEARAC, MERRAC	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	NOWPAP-IGM	NOWPAP-IGM	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	CEARAC, MERRAC	CEARAC, MERRAC	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	DINRAC, MERRAC, CEARAC	DINRAC, MERRAC, CEARAC	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	0	1	1	0.86
3 and 5	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
Average	0.10	0.10	0.10	0.10	0	0.10	0.10	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the five issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries in this LME (WCPFC and APFIC) each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to be any formal connection between the two arrangements, possibly since they have different areas of competence. For the pollution, NOWPAP potentially serves an integrating function but it does not appear to be linked to the fisheries arrangements, despite the impacts of pollution on the fisheries. Significantly, no formal arrangement for biodiversity was identified in this LME, despite the consequences arising from biodiversity loss as identified in the report for this LME by Sherman and Hempel (2009). It may be assumed that PEMSEA, with its concern for coastal management issues has addressed this issue but PEMSEA depends on voluntary action. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

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In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the East China Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

East China Sea LME	Completeness	Integration	Engagement
	43%	0.1	83%

4 References

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[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Faroe Plateau LME

1 The system to be governed

The system is the Faroe Plateau LME. It surrounds the Faroe Islands in the northeast Atlantic Ocean. It is a well-defined and geographically uniformed system, with a surface area of about 105,000 km^2 almost entirely within the marine waters of the Faroe Islands, Denmark (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 38), so a review is not provided here.

Table 1. Percentage of Faroe Plateau LME area taken up by the EEZ of each country and the High Seas (area = 105,000 km^2)

Country (N to S)	Percent of LME area
Denmark (Faeroe Islands)	98.1
United Kingdom	1.5

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in Chapter 38 (Sherman and Hempel 2009) as follows:

- Fisheries
  - high proportion of collapsed stocks
- Pollution
  - (LBS) long distance transport of pollutants by ocean atmospheric currents from the highly industrialized countries; bioaccumulation of mercury in whales, pelagic fish, and seabirds;

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. North-East Atlantic Fisheries Commission (NEAFC)

7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Faroe Plateau LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Faroe Plateau LME (area = 104,595 km^2)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	0.2	30.4	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
International Council for the Exploration of the Sea (ICES)	1	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	1	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	100	C
North-East Atlantic Fisheries Commission (NEAFC)	1	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	1	100	C

The extent of country membership in these bodies and instruments for the Faroe Plateau LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Faroe Plateau LME							
Coastal countries in the LME	Agreements						
	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	AC
Denmark (Faroe Islands)			B	B	B	B	C
United Kingdom	B	B	N			B	N
% engagement	50	50	100	50	50	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed							

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Faroe Plateau LME[i] – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Faroe Plateau LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Only Denmark is a member of NAMMCO.
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Faroe Plateau LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Faroe Plateau LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: Faroe Plateau LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)?	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Faroe Plateau LME – Transboundary Arrangement General – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
		Overall total and % completeness >>	14/21 = 67%		

Table 5: Faroe Plateau LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Denmark (Faroe Islands), United Kingdom**	**System name: Faroe Plateau**		**Region: North East Atlantic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution - LBS	3		67%		Arctic Council
Pollution - MBS	3		67%		Arctic Council
	System architecture completeness index >>		77%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)								
Policy cycle stage	**Fisheries - Salmon**	**Fisheries – marine mammals**	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Pollution – LBS**	**Pollution – MBS**	**Pollution – LBS**	**Pollution – MBS**
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Arctic Council	Arctic Council
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements for the Faroe Plateau LME. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	1	1	1	1	1	1	1	1
Average	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.1 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Since the LME is largely a single country one and Denmark has a focus on EBM, the integration may be taking place at the national level. Nevertheless, this LME has been assigned an overall integration score of 1.0 due to the EU

Maritime Policy which functions as an overall policy coordinating mechanism for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Faroe Plateau LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Faroe Plateau LME	Completeness	Integration	Engagement
	77%	1.0	71%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009.The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

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Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Greenland Sea LME

1 The system to be governed

The system is the Greenland Sea LME. It has a surface area of 519,593 km^2. It primarily extends from Eastern Greenland, with the majority of the LME falling within the maritime domain of Denmark and the remainder within the marine waters of Iceland and Norway. There is no area of high seas in the LME (Table 1).

Table 1. Percentage of the Greenland Sea LME area taken up by the EEZ of each country and the High Seas (area = 519,593 km^2)

Country	Percent of LME area
Denmark (Greenland)	78.7
Iceland	12.9
Norway (Jan Mayen)	8.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

This LME comprises what was previously the East Greenland Shelf LME plus an additional offshore area to the north. Therefore, an overview that pertains largely to the coastal shelf area of this LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIII - 39: East Greenland Shelf). This assessment is also informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 39 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - high proportion of collapsed stocks; overfishing; decimation of several whale species; slow recovery of the overexploited right whale;
- Pollution
  - high levels of PCB and DDT; presence of persistent organic pollutants (POPs)
- Climate change
  - environmental consequences and biological effects

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. North-East Atlantic Fisheries Commission (NEAFC)
8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
9. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
10. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
11. European Union Common Fisheries Policy (CFP)
12. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Greenland Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Greenland Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
Arctic Council (AC)	6	88	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	8	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	<1	<1	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	6	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	6	100	C
North-East Atlantic Fisheries Commission (NEAFC)	9	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)	9	100	C

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 2: Spatial overlap of transboundary agreements with the Greenland Sea LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)			
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)			
European Union Common Fisheries Policy (CFP)			

The extent of country membership in these bodies and instruments for the Greenland Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Greenland Sea LME										
Coastal countries in the LME	Agreements									
	AC	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	ASCOBANS	Bonn Agreement	EU-CFP
Denmark	C		B			B	B	B	B	B
Iceland	C	B	B	B	N	B	B			B
Norway	C	B	B	B	B	B	B	C	B	
% engagement	100	67	100	67	50	100	100	33	67	67
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed										

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4a to 4i. They are summarised in Table 5

Table 4a: Greenland Sea LME[i] – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4b. Greenland Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Greenland Sea LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Greenland Sea LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Greenland Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Greenland Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4g: Greenland Sea LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4h: Greenland Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4i: Greenland Sea LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Greenland Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Denmark, Norway, Iceland**		**System name: Iceland Shelf LME**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (marine mammals)	3		71%		NAMMCO
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries – EEZ	3		90%		EU-CFP
Pollution (LBS)	3		90%		OPSAR
Pollution (LBS)	3		67%		AC
Pollution (MBS)	3		67%		AC
Pollution (MBS)	3		90%		OSPAR
Pollution (MBS)	3		38%		Bonn
Biodiversity – General	3		90%		OSPAR
Biodiversity – General	3		67%		AC
Biodiversity – Specific	3		62%		ASCOBANS
	System architecture completeness index >>		74%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-4i) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)													
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Fisheries - EEZ**	**Pollution - MBS**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Bonn Agreement – Contracting Parties	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	ASCOBANS Advisory Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme ; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	European Commission	Meeting of the Parties	OSPAR Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	Advisory Councils Scientific, Technical and Economic Committee for Fisheries	Contracting Parties	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR - Biodiversity and Ecosystem Committee and Working Groups	ASCOBANS Advisory Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and	Arctic Council - Emergency preparedness, Prevention and response; Protection	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)													
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Fisheries - EEZ**	**Pollution - MBS**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
					(STECF)		Groups				Assessment programme SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	European Commission	Meeting of the Parties	OSPAR Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Contracting Parties	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Contracting Parties	Countries	Countries	Countries
Review and evaluation	NEAFC - Permanent	Conservation and	NASCO Council	NAMMMCO Council	Commission STECF	Meeting of the Parties	OSPAR Commission,	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)													
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Fisheries - EEZ**	**Pollution - MBS**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	Committee on Control and Enforcement (PECCOE)	Management Measures Compliance Committee (CMMCC)		Committee on Inspection and Observation			Main Committees and Working Groups	Main Committees and Working Groups	Main Committees and Working Groups				
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Contracting Parties Commission STECF Advisory Councils	Contracting Parties	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Contracting Parties, Secretariat, Advisory Committee, Co-ordinating Authorities	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.3
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
1 and 12	0	0	0	0	0	0	0	0
1 and 13	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
2 and 12	0	0	0	0	0	0	0	0
2 and 13	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
3 and 12	0	0	0	0	0	0	0	0
3 and 13	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0

4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
4 and 12	0	0	0	0	0	0	0	0
4 and 13	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
5 and 12	0	0	0	0	0	0	0	0
5 and 13	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
6 and 11	0	0	0	0	0	0	0	0
6 and 12	0	0	0	0	0	0	0	0
6 and 13	0	0	0	0	0	0	0	0
7 and 8	0	1	0	1	1	1	1	0.7
7 and 9	0	1	0	1	1	1	1	0.7
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
7 and 12	0	0	0	0	0	0	0	0
7 and 13	0	0	0	0	0	0	0	0
8 and 9	0	1	0	1	1	1	1	0.7
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
8 and 12	0	0	0	0	0	0	0	0
8 and 13	0	0	0	0	0	0	0	0
9 and 10	0	0	0	0	0	0	0	0
9 and 11	0	0	0	0	0	0	0	0
9 and 12	0	0	0	0	0	0	0	0
9 and 13	0	0	0	0	0	0	0	0
10 and 11	0	0	0	0	0	0	0	0
10 and 12	0	0	0	0	0	0	0	0
10 and 13	0	0	0	0	0	0	0	0
11 and 12	0	1	0	1	0	1	1	0.6
11 and 13	0	1	0	1	0	1	1	0.6
12 and 13	0	1	0	1	0	1	1	0.6
Average	0.01	0.1	0.01	0.1	0.04	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the nine issues is 0.1 out of a possible 1.

3 Conclusions

None of the fisheries arrangements (NEAFC, ICCAT, NAMMCO, NASCO and EU-CFP) appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity. Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent.

It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For Greenland Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Greenland Sea LME	Completeness	Integration	Engagement
	74%	0.1	75%

4 References

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Guinea Current LME

1 The system to be governed

The system is the Guinea Current LME. This includes the marine waters of the countries shown in Table 1 and a significant area of High Seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter I-2), so a review is not provided here. This assessment is also informed by the TDA, Project Document and SAP (GCLME Project 2006, GCLME Project 2007).

Table 1. Percentage of Guinea Current LME area taken up by the EEZ of each coastal country and the High Seas (area = 1 910 412 km^2)

Country	Percent of LME area
Angola	1.1
Benin	1.6
Cameroon	0.7
Democratic Republic Congo	<0.1
Equatorial Guinea	4.4
Gabon	9.9
Ghana	10.7
Guinea	5.7
Guinea Bissau	4.9
Ivory Coast (Côte d'Ivoire)	9.0
Joint Regime (Nigeria - Sao Tome and Principe)	1.7
Liberia	12.7
Nigeria	9.4
Republique du Congo	2.1
Sao Tome and Principe	5.3
Senegal	0.7
Sierra Leone	8.3
Togo	0.8
High Seas	11.1

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The key transboundary issues were summarized in the TDA (GCLME Project 2006) as follows:

- Decline in GCLME fish stocks and unsustainable harvest of living resources;
- uncertainty regarding ecosystem status, integrity (changes in community composition, vulnerable species and biodiversity, introduction of alien species) and the yields in a highly variable environment including effects of global climate change;
- Deterioration in water quality (chronic and catastrophic) from land and sea-based activities, eutrophication, and harmful algal blooms
- Habitat destruction and alteration including inter-alia modifications and seafloor and coastal zone, degradation of coastalscapes, coastal erosion.

The TDA further breaks these down into 12 specific problems. Based on these the following key transboundary issues to be addressed by governance arrangements were identified:

- Fisheries - decline in GC CLME fish stocks and sustainable harvest of living resources
    - Small pelagics

    - Demersal finfish and shrimps
    - HMS – tunas and tuna-like species
- Biodiversity
    - Habitat destruction and alteration including inter-alia modifications and seafloor and coastal zone, degradation of coastalscapes, coastal erosion.
- Pollution - deterioration in water quality (chronic and catastrophic) from land and sea-based activities, eutrophication, and harmful algal blooms

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Abidjan Convention – Abidjan Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region
    a. Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency in the Western and Central African Region – Emergency Protocol
    b. Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from Land-Based Sources and the Activities (LBSA) in the Western, Central and Southern Africa Region - LBS Protocol – not yet in force
2. CECAF - FAO Fishery Committee for the Eastern Central Atlantic (COPACE in French)
        a. Scientific Sub-Committee
            i. Working Group for Small Pelagics,
            ii. Working Group for Demersal Species,
            iii. Working Group for Artisanal Fisheries.
3. RCFCASBA - Regional Convention on Fisheries Cooperation among African States Bordering on the Atlantic Ocean (Dakar Convention, 1992) 1995. This gives rise to ATLAFCO (COMHAFAT in French), the Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean.
4. ICCAT - International Commission for the Conservation of Atlantic Tunas
5. NEPAD - New Partnership for Africa's Development - COSMAR - Coastal and Marine Secretariat (NEPAD), Nairobi
6. SRFC – Subregional Fisheries Commission (CSRP in French)(membership includes Guinea and Sierra Leone in LME and several countries in the adjacent Canary Current LME), 1985

7. PRCM - Charter of the West African Regional Marine and Coastal Conservation Partnership (PRCM), 2012[1]
8. Regional Fisheries Committee for the Gulf of Guinea (COREP)
9. Fisheries Committee for the West-Central Gulf of Guinea (FCWC)
10. Strategic Action Programme (SAP) for the Guinea Current Large Marine Ecosystem (GCLME)
11. Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region, 1981

Multipurpose regional bodies

12. The Economic Community of Central African States (ECCAS)
13. The Economic Community for Livestock, Meat and Fisheries Resources (CEBEVIRAH), a subsidiary body to the Economic Monetary Community of Central African States (CEMAC)
14. The Economic Community of West African States (ECOWAS)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Guinea Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Guinea Current LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[2]
Abidjan Convention	36	87	D
CECAF	13	98	C
COMHAFAT	8	100	C
COREP	91	18	B
FCWC	97	44	B
ICCAT	2	100	C
SRFC	25	20	D

The extent of country membership in these bodies and instruments for the Guinea Current LME is shown in Table 3.

[1]Countries involved in the PRCM correspond to the countries represented in the Sub-Regional Fisheries Commission (SRFC)

[2]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Guinea Current LME									
Coastal countries	Agreements								
	Abidjan	Abidjan (Emergency)	Abidjan (LBSA)	CECAF	COMHAFAT	COREP	FCWC	SRFC	ICCAT
Angola				C	B	N	N	N	B
Benin	B	B		C	B	N	B	N	
Cameroon	B	B		C	B	B	N	N	
Dem. Rep. Congo				C	B	B	N	N	
Equatorial Guinea				C	B	N	N	N	B
Gabon	B	B		C	B	B	N	N	B
Ghana	B	B		C	B	N	B	N	B
Guinea	B	B		C	B	N	N	B	B
Guinea Bissau	B	B		C	B	N	N	B	
Ivory Coast (Côte d'Ivoire)	B	B		C	B	N	B	N	B
Liberia	B	B		C	B	N	B	N	
Nigeria	B	B		C	B	N	B	N	B
Rep. du Congo	B	B		C		B	N	N	
Sao Tome and Principe				C	B	B	N	N	B
Senegal	B	B		C	B	N	N	B	B
Sierra Leone	B	B		C	B	N	N	B	B
Togo	B	B		C	B	N	B	N	
% engagement	76	76		100	94	100	100	100	59

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-d. These are summarized in Table 5.

Table 4a: Guinea Current LME[i] – Transboundary arrangement for fisheries - small pelagic resources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	COREP Technical Committee FCWC Advisory and Coordinating Committee SRFC Coordinating Committee	LME	3	Partner countries and organisations provide support (e.g. Russia, EU)	• Each of these three bodies only covers a part of the LME: SRFC only covers the northernmost area of GCLME (Guinea and Sierra Leone) and area of responsibility extends north into CCLME (it is not generally considered as a Gulf of Guinea organisation); COREP covers five countries in the central Gulf of Guinea; FCWC covers six countries in the Eastern Gulf of Guinea. • ATLAFCO has a broad policy coordination mandate along the entire western coast of Africa • CECAF covers: o EEZs of all countries of the GCLME o EEZs of all countries of the CCLME o Adjacent High Seas • While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to COREP, FCWC and SRFC whose decisions are not binding either. • Organisational support for COREP, FCWC and SRFC member countries. CECAF assists with non-member countries • Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,
Policy decision-making	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	LME	2		
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Small Pelagics COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	LME	3		
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	LME	2		
Implementation	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	LME/ National	1		
Review and evaluation	CECAF Scientific Sub-Committee	Supra-LME	2		
Data and information	CECAF Scientific Sub-Committee with Working Group for Small Pelagics Countries	Supra-LME	2		
Overall total and % completeness >>			15/21= 71%		

Table 4b: Guinea Current LME – Transboundary arrangement for fisheries - demersal finfish and shrimps					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		

Policy analysis and advice	COREP Technical Committee
	FCWC Advisory and Coordinating Committee
	SRFC Coordinating Committee
		LME	3	Partner countries and organisations provide support (e.g. Russia, EU)	• Each of these three bodies only covers a part of the LME: SRFC only covers the northernmost area of GCLME (Guinea and Sierra Leone) and area of responsibility extends north into CCLME (it is not generally considered as a Gulf of Guinea organisation); COREP covers five countries in the central Gulf of Guinea; FCWC covers six countries in the Eastern Gulf of Guinea.
					• ATLAFCO has a broad policy coordination mandate along the entire western coast of Africa
					• CECAF covers:
					  ○ EEZs of all countries of the GCLME
					  ○ EEZs of all countries of the CCLME
					  ○ Adjacent High Seas
					• While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to COREP, FCWC and SRFC whose decisions are not binding either.
					• Organisational support for COREP, FCWC and SRFC member countries. CECAF assists with non-member countries
					• Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,

Policy decision-making	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	LME	2		
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Demersal Species COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	LME	3		
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	LME	2		
Implementation	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	LME/ National	1		
Review and evaluation	CECAF Scientific Sub-Committee with Working Group for Demersal Species	LME	2		
Data and information	CECAF Scientific Sub-Committee with Working Group for Demersal Species Countries	LME	2		
Overall total and % completeness >>			15/21= 71%		

Table 4c: Guinea Current LME – Transboundary arrangement for Summary for fisheries - tuna					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3		• Nine of the 16 coastal countries in this LME are members of ICCAT • Is there a regionally coordinated approach to ICCAT? • Are there are stocks of small tunas occurring mainly within the LME for which ICCAT has a mandate but does little regarding management, other than catch monitoring (recreational fishing) • Are there trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4d:Guinea Current LME – Transboundary arrangement for (a) Pollution – LBS (nutrients, sediments, pesticides) and and MBS (hydrocarbons) and (b) biodiversity - general					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Abidjan Convention RCU	Supra-LME	1		• According to the Convention all the above issues can be dealt with by this one arrangement, although sub-processes will be needed for each issue. • The Abidjan Convention includes the majority of GCLME countries (14 of 16). • It indicates that it will seek to address issues in collaboration with the GCLME Project, but the mode of interaction does not appear to be formal • This arrangement will be strengthened when the 2012 LBS Protocol comes into force Biodiversity • Issues appear to be fully covered by the Abidjan Convention although only MPAs are mentioned in this regard rather than biodiversity specific measures • There is a manatee program that is species specific. Habitat modification • This issue which is raised as priority in the TDA is also broadly covered by the Abidjan Convention. • There is a mangrove charter under the PRCM and countries are seeking to change this to a Protocol under the Abidjan Convention
Policy decision-making	Abidjan Convention COP	Supra-LME	1		
Planning analysis and advice	Abidjan Convention RCU	Supra-LME	1		
Planning decision-making	Abidjan Convention COP	Supra-LME	1		
Implementation	RCU/Countries	National	1		
Review and evaluation	Abidjan Convention RCU	Supra-LME	1		
Data and information	Abidjan Convention RCU/countries	Supra-LME	1		
Overall total and % completeness >>			7/21 = 33%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Guinea Current LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** See Table 1		**System name:** Guinea Current LME		**Region:** South Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - small pelagic resources			71		Three sub-regional commissions, CECAF and COMHAFAT
Fisheries - demersal finfish and shrimps			71		
Fisheries - tuna			81		ICCAT
Pollution - LBS			33		Abidjan
Pollution - MBS			33		
Biodiversity- general			33		Abidjan
	System architecture completeness index >>		54%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)					
Policy cycle stage	Fisheries –Small pelagics	Fisheries – Demersal finfish and shrimps	Fisheries - Tuna	Pollution - - LBS and MBS	Biodiversity – general (including habitat modification)
Policy analysis and advice	COREP Technical Committee FCWC Advisory and Coordinating Committee SRFC Coordinating Committee	COREP Technical Committee FCWC Advisory and Coordinating Committee SRFC Coordinating Committee	ICCAT Standing Committee on Research and Statistics (SCRS)	Abidjan Convention RCU	Abidjan Convention RCU IUCN, UNEP contribute

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)					
Policy cycle stage	Fisheries –Small pelagics	Fisheries – Demersal finfish and shrimps	Fisheries - Tuna	Pollution - - LBS and MBS	Biodiversity – general (including habitat modification)
Policy decision-making	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	ICCAT Commission	Abidjan Convention COP	Abidjan Convention COP
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Small Pelagics COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	CECAF Scientific Sub-Committee with Working Group for Demersal Species COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	ICCAT SCRS and Species Panels	Abidjan Convention RCU	Abidjan Convention RCU
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	Session of CECAF (comprising fishery administrators and scientists)	ICCAT Commission	Abidjan Convention COP	Abidjan Convention COP
Implementation	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	Countries	RCU/Countries	Countries
Review and evaluation	CECAF Scientific Sub-Committee	CECAF Scientific Sub-Committee with Working Group for Demersal Species	Conservation and Management Measures Compliance Committee (CMMCC)	Abidjan Convention RCU	Abidjan Convention RCU
Data and information	CECAF Scientific Sub-Committee with Working Group	CECAF Scientific Sub-Committee with Working Group	Permanent Working for the Improvement of ICCAT Statistics	Abidjan Convention RCU/countries	Abidjan Convention RCU/countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)					
Policy cycle stage	Fisheries –Small pelagics	Fisheries – Demersal finfish and shrimps	Fisheries - Tuna	Pollution - - LBS and MBS	Biodiversity – general (including habitat modification)
	for Small Pelagics Countries	for Demersal Species Countries	and Conservation Measures (PWG)		

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	1	1	1	1	1	1	1	1
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	0	1	1	0.9
4 and 6	1	1	1	1	0	1	1	0.9
5 and 6	1	1	1	1	0	1	1	0.9
Average	0.3	0.3	0.3	0.3	0.1	0.3	0.3	0.2

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1.

The policy processes for small pelagic and demersal fisheries in areas under national jurisdiction are complex and fragmented. At the policy and technical levels COMHAFAT and CECAF respectively have the broad geographical coverage required for EBM. Management decision-making and implementation however is where fragmentation occurs being distributed among three subregional RFBs. Whereas, these RFBs include all but two of the countries in the LME, the extent to which their activities are harmonised is unclear. The fact that decisions taken in

CECAF and the three RFBs are not binding, seriously weakens these arrangements. Also, the fact that implementation and monitoring of ICCAT decisions are solely the responsibility of countries seriously weakens that arrangement.

The Abidjan Convention is currently a relatively weak arrangement for pollution and biodiversity, as there are no protocols to give effect to its intent for these issues. There appears to be potential for good integration of fisheries issues for resources within national jurisdiction through the COMHAFAT and CECAF, especially if the three subregional RFBs can be harmonized. However, these do not appear to be well integrated with tuna fisheries under ICCAT.

The fact that the Abidjan Convention area does potentially include all countries in the GCLME does indicate its potential for dealing comprehensively with these transboundary issues. The question remains as to what the role of the IGCC is likely to be and whether it should be COMHAFAT or the Abidjan convention (or some combination of the two) that assumes overarching responsibility for integration and coordination across the full range of issues required for EBM. COMHAFAT also has membership of all coastal countries in this LME. While COMHAFAT is strictly a fisheries organization, an EAF as defined by FAO would include attention to pollution and biodiversity issues connected with fisheries.

3 Conclusions

The two arrangements (COMHAFAT and CECAF) for fisheries in the areas within national jurisdiction are closely connected. So are the arrangements for pollution and biodiversity that fall under the Abidjan Convention. However neither of these pairs appears to be integrated with each other or with the tuna arrangement ICCAT. No agreed integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be identified. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal. It appears that the Interim Guinea Current Commission (IGCC) was been established with a view overall integration and coordination of marine ecosystem governance issues. However, the current status and level of acceptance among the countries and other organisations in the region, of the IGCC's role in overarching coordination is unclear.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Guinea Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Guinea Current LME	Completeness	Integration	Engagement
	54%	0.2	78%

4 References

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Gulf of Mexico LME

1 The system to be governed

The system is the Gulf of Mexico (GoM) LME, an approximate 1.5 million km^2 semi-enclosed oceanic basin with a water volume of roughly 2.5 × 10^{15} m^3. Its basin is shared by Mexico, the US and Cuba. (Table 1)

Table 1. Percentage of Gulf of Mexico LME area taken up by the EEZ of each country and the High Seas (area = 1,526,331 km^2)

Country	Percent of LME area
Cuba	3.6
Mexico	47.9
United States	45.8
High Seas	2.7

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

In terms of its marine area, Mexico has jurisdiction over 735,438 km^2 of the GoM, the US has 700,172 km^2 and Cuba 55,862 km^2 (Yoskowitz et al., 2013). It should be noted that while Cuba is not a coastal state within the LME, its EEZ does extend into the LME. There are also two areas (Western and Eastern Gaps) totaling some 35,000 km^2 that falls beyond the national jurisdiction of the three countries. While all three countries share maritime borders with each other, the involvement of Cuba in the governance of the GoM LME has been minimal due to long-standing differences affecting international relations with the US. However, there is a clear recognition of the importance of Cuba's participation to the successful implementation of integrated management initiatives in the GoM (TDA, 2011, p.25).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XV- 50), so a review is not provided here. This assessment is also informed by the GoM LME TDA (GEF/UNIDO, 2011), the Gulf of Mexico SAP, NOAA Integrated Ecosystem Assessment Program for the Gulf of Mexico and the report by Yoskowitz et al. (2013) entitled *Gulf 360: State of the Gulf of Mexico*.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the TDA (2011) and summarized in the SAP and focus on impacts arising from high fishing pressure, oil and gas production, pollution, shoreline development, hydrologic changes through artificial drainage, agriculture, and nutrient loading:

- Fisheries
    - Non-optimal harvesting of commercial species (over-fishing, fishing undersized organisms and reproductive adults, dumping of by-catch)
    - IUU fishing

- Pollution
    - LBS (nutrients, sediments, pesticides, trace metals and emerging pollutants)
    - MBS (hydrocarbons)
- Biodiversity
    - Habitat alteration and/or loss, particularly wetlands and marine areas due to hypoxia
    - Depleted non-commercial species and associated marine flora and fauna
    - Alien invasive species

From a transboundary governance perspective, it is possible and desirable to combine several of the above issues under single governance arrangements. The TDA (2011) indicated a preference for three main categories of transboundary issues, each with sub issues - fisheries, biodiversity, pollution (both land-based and marine-based) and identified the concerns arising from climate change as a cross-cutting issue. In addition to these major issue areas (with their sub-issues as identified above), the TDA (2011) also identified potential root causes responsible for the identified transboundary issues including: incomplete information and understanding of ecosystem functioning; difficulty in assigning value for ecosystem services; current inability to promote an ecosystem approach and insufficient coordination between governments. It is important to note that issues that were the responsibility of a single country, such as over-capitalization of the fishing fleet and economic inefficiencies, were not included in this assessment even though this issue might be present in more than one country in the system. Additionally, climate change induced sea-level rise and increasing frequency and severity of storms, although listed as problems in the GoM TDA (2011), were excluded from the assessment of governance arrangements in the system since no regional level agreements are currently in place to address this global issue.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Cartagena Convention – Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).

This is a comprehensive, umbrella agreement for the protection and development of the marine environment. This regional environmental convention provides the legal framework for cooperative regional and national actions in the Wider Caribbean Region, including the GoM. The Convention is supplemented by

a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region which was also adopted in 1983 and entered into force on 11 October 1986;

b. Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region which was adopted on 18 January 1990. The Protocol entered into force on 18 June 2000;

    c. Protocol Concerning Pollution from Land-Based Sources and Activities which was adopted on 6 October 1999. The Protocol entered into force on 13 August 2010.

2. WECAFC - FAO Western Central Atlantic Fishery Commission
    a. OSPESCA/WECAFC/CRFM/CFMC Working Group on Spiny Lobster
    b. WECAFC/OSPESCA/CRFM/CFMC Working Group on Recreational Fisheries
    c. CFMC/OSPESCA/WECAFC/CRFM Queen Conch Working Group
    d. CFMC/WECAFC Spawning Aggregations Working Group
3. ICCAT - International Commission for the Conservation of Atlantic Tunas
4. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
5. Latin American Organization for Fisheries Development (OLDEPESCA)
6. MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances.
7. Gulf of Mexico Strategic Action Program (SAP)
8. Gulf of Mexico Alliance (GOMA)
    a. US-Mexico Habitat Conservation and Restoration Team
    b. Tri-national Initiative for Marine Science and Conservation in the Gulf of Mexico and Western Caribbean

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Gulf of Mexico LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Gulf of Mexico LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
Cartagena Convention and Protocols	23	100	C
ICCAT	2	100	C
OLDEPESCA	11	50	D
WECAFC	8	100	C
IAC		100	C

The extent of country membership in these bodies and instruments for the Gulf of Mexico LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Gulf of Mexico LME									
Coastal countries in the LME	Agreements								
	Cartagena	Cartagena - Oil spills	Cartagena - LBS	Cartagena - SPAW	MEXUS - GULF	ICCAT	IAC	OLDE-PESCA	WECAFC
Cuba	B	B		B	N			B	C
Mexico	B	B		C	B	B	B	B	C
United States	B	B	B	B	B	B	B	N	C
% engagement	100	100	33	67	100	67	67	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-g. They are summarised in table 5

Table 4a: Gulf of Mexico LME[i] – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	WECAFC	US is not a member of OLDEPESCA How significant is OLDEPESCA to the members of this LME?
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4b: Gulf of Mexico LME – Transboundary arrangements for fisheries - EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WECAFC Scientific Advisory group, and WGs. Commission	Supra-LME	2	OLDEPESCA	What role, if any, does WECAFC play in this LME?
Policy decision-making	WECAFC Commission	Supra-LME	0		
Planning analysis and advice	Working Groups and Partners	Supra-LME	2		
Planning decision-making	WECAFC Commission	Supra-LME	0		
Implementation	Countries Partner Organizations	National LME	0		
Review and evaluation	Working Groups and Commission	Sub-LME	1		
Data and information	Countries, FAO HQ and Working Groups	National Supra-LME	1		
Overall total and % completeness >>			6/21 = 29%%		

Table 4c. Gulf of Mexico LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3	The Billfish Foundation (TBF), International Game Fish Association (IGFA) GCFI	Mexico and US are members but not Cuba
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4d. Gulf of Mexico LME – Transboundary arrangement for Pollution – LBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	LBS Scientific and Technical Advisory Committee (STAC)	Supra-LME	3		To what extent is the Cartagena Convention and its protocols significant agreements in the arrangement for Pollution and Biodiversity in the LME?
Policy decision-making	IGM LBS CoP	Supra-LME	1		
Planning analysis and advice	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Supra-LME	2		
Planning decision-making	LBS CoP	Supra-LME	1		
Implementation	Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	LBS STAC	Supra-LME	2		
Data and information	Countries RCUs RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4e. Gulf of Mexico LME – Transboundary arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Supra-LME	3	MEXUS -Gulf	The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico.
Policy decision-making	Cartagena Conv. – IGM, Oil Spill CoP	Supra-LME	1		
Planning analysis and advice	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC),RAC/REMPEITC-Carib	Supra-LME	2		
Planning decision-making	Cartagena Conv. - Oil Spill CoP	Supra-LME	1		
Implementation	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Review and evaluation	Cartagena Conv. - Oil Spill STAC	Supra-LME	2		
Data and information	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f. Gulf of Mexico LME – Transboundary arrangement for Biodiversity – Habitat alteration and depleted non-commercial species					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	Supra-LME	3	TNC, CoML	Cuba and U.S. are parties to the SPAW Protocol but not Mexico.
Policy decision-making	SPAW IGM and CoP	Supra-LME	2		
Planning analysis and advice	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	Supra-LME	2		
Planning decision-making	SPAW CoP	Supra-LME	2		
Implementation	SPAW Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	SPAW STAC	Supra-LME	2		
Data and information	SPAW Countries RCUs RACs	Supra-LME	2		
Overall total and % completeness >>			15/21 = 71%		

Table 4g: Gulf of Mexico LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both USA and Mexico are parties to the IAC, but not Cuba
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Gulf of Mexico LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Argentina, Uruguay, United Kingdom**	**System name: Patagonian Shelf**		**Region: South Atlantic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – General	3		43%		
Fisheries – General, excluding HMS	3		29%		
Fisheries –Tuna and tuna-like species	3		86%		
Pollution – LBS	3		62%		
Pollution - MBS	3		62%		
Biodiversity – habitat modification from dredging and deposition	3		71%		
Biodiversity – Turtles	3		57%		
	System architecture completeness index >>		58%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Biodiversity - alien invasive species

There are apparently multiple sources of the perceived threat, e.g. ballast water, introductions from aquaculture, introductions from aquaria. This is a rather specific issue that seems to have been included with pollution in the TDA for want of a more appropriate location. However, it is an issue of serious concern that probably needs its own arrangement within the Cartagena Convention as it does not fit under an existing arrangement.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)							
Policy cycle stage	**Fisheries - General**	**Fisheries – General, non HMS**	**Fisheries - HMS**	**Pollution – LBS**	**Pollution - MBS**	**Biodiversity – Habitat modification**	**Biodiversity - Turtles**
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	WECAFC Scientific Advisory group, and WGs. Commission	ICCAT Standing Committee on Research and Statistics (SCRS)	LBS Scientific and Technical Advisory Committee (STAC)	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	IAC Consultative and Scientific Committees
Policy decision-making	OLDEPESCA - Council of Ministers	WECAFC Commission	ICCAT Commission	IGM LBS CoP	Cartagena Conv. – IGM, Oil Spill CoP	SPAW IGM and CoP	IAC Consultative Committee and CoP
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Working Groups and Partners	ICCAT SCRS and Species Panels	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC-Cuba IMA-RAC-Trinidad	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC),RAC/REMPEITC-Carib	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	IAC Consultative and Scientific Committees
Planning decision-making	Countries	WECAFC Commission	ICCAT Commission	LBS CoP	Cartagena Conv. - Oil Spill CoP	SPAW CoP	IAC CoP
Implementation	Countries	Countries Partner Organizations	Countries	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs, RACs	SPAW Countries RCUs RACs	Countries
Review and evaluation	OLDEPESCA - Council of Ministers	Working Groups and Commission	Conservation and Management Measures Compliance Committee (CMMCC)	LBS STAC	Cartagena Conv. - Oil Spill STAC	SPAW STAC	Countries
Data and information	Countries OLDEPESCA – Secretariat	Countries, FAO HQ and Working Groups	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs, RACs	SPAW Countries RCUs RACs	Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
4 and 7	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
6 and 7	0	0	0	0	0	0	0	0
Average	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this LME, integration across the arrangements for the seven issues is consistently low at 0.2 out of a possible 1.

3 Conclusions

In this LME, none of the arrangements for fisheries (OLDESPECA, WECAFC and ICCAT) appear to be closely connected. However, the arrangements for pollution and biodiversity within the LME are closely integrated within the Cartagena Convention. The specific biodiversity arrangement for turtles does not appear to be linked to any of the arrangements within the LME. Overall, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. However, this is not to suggest that there is not an abundance of collaboration and interactions amongst the fisheries arrangements through participation in each other's

meetings, complementing the integration found within the arrangements for pollution and biodiversity.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Gulf of Mexico LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Gulf of Mexico LME	Completeness	Integration	Engagement
	58%	0.2	81%

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Gulf of Thailand LME

1 The system to be governed

The system is the Gulf of Thailand LME. It is located in Southeast Asia and bordered by Cambodia, Malaysia, Thailand and Vietnam. It covers a surface area of over 380,000 km^2 (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VIII-11), so a review is not provided here. This assessment is also informed by the South China Sea TDA 2000 (which includes the Gulf of Thailand LME).

Table 1. Percentage of Gulf of Thailand LME area taken up by the EEZ of each country and the High Seas (area = 383,662 km^2)

Country	Percent of LME area
Cambodia	12.4
Malaysia	21.0
Thailand	48.4
Vietnam	18.2

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) and TDA (2000) as follows:

- Fisheries
  - overexploitation of the local demersal fish stocks; excessive bycatch; destructive fishing
- Biodiversity
  - loss of unique biological diversity and the loss of mangrove services
  - habitat Modification - mangrove destruction; progressive degradation of coral reefs; degradation and/or widespread modification of seagrass habitats
- Pollution
  - liquid wastes from domestic, agricultural pesticides and industrial effluents, as well as sediments and solid wastes (severe in localized areas)
  - phytoplankton blooms, toxic and non-toxic algal blooms, paralytic shellfish poisoning in parts of the region
  - petroleum hydrocarbons and oil spills

2.2 Identify arrangements for each transboundary issue

Governance of the LME is shared by the four bordering countries. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)

2. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (PIF/FFA) (what role does this organization have in this LME?)
3. South East Asian Fisheries Development Center (SEAFDEC)
4. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
5. Coordinating Body on the Seas of East Asia (COBSEA)
6. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
7. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
8. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
9. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlap the Gulf of Thailand LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Gulf of Thailand LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Asia Pacific Fisheries Commission (APFIC)	3	100	C
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	1	100	C
South East Asian Fisheries Development Center (SEAFDEC)	2	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	<1	100	C
Coordinating Body on the Seas of East Asia (COBSEA)		100	C
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the Gulf of Thailand LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Gulf of Thailand LME								
LME coastal countries	Agreement							
	APFIC	FFA	SEAFDEC	WCPFC	COBSEA	PEMSEA	IOSEA	Dugong
Cambodia	B	N	C	N	C	C	C	
Malaysia	B	N	C		C	C	C	
Thailand	B	N	C		C	C	C	C
Vietnam	B	N	C		C	C	C	
% engagement	100	0	100	0	100	100	100	25
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e.
They are summarised in table 5

Table 4a: Gulf of Thailand LME[i] – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	• None of the countries are members of WCPFC. What the implications of this, if any, given that there is no high seas area in the LME and virtually no catch for tuna and tuna-like species reported for the LME? • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the South China Sea LME, none of the countries of this LME are members. What are the implications of this for this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: Gulf of Thailand LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Gulf of Thailand LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity – Habitat Modification					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: Gulf of Thailand LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: Gulf of Thailand LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5:Gulf of Thailand LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Cambodia, Malaysia, Thailand, Vietnam**		**System name: Gulf of Thailand**		**Region: East Asia**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (Tuna and tuna-like)	4		90%		
Fisheries – EEZ	4		38%		
Pollution –LBS	4		38%		
Pollution – MBS	4		38%		
Biodiversity – Habitat Modification	4		38%		
Biodiversity – Specific	4		52%		
Biodiversity – specific (dugong)	4		52%		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)							
Policy cycle stage	**Fisheries – HMS**	**Fisheries – EEZ**	**Pollution – LBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.57
3 and 5	1	1	1	0	0	1	0	0.57
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.1.4	0.14	0.14	0	0	0..14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries (APFIC and WCPFC) in the areas each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to be any formal connection between the two arrangements, possibly since they have different areas of competence. However, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However, the “within national jurisdiction” arrangement for fisheries and for pollution and biodiversity do not appear to be integrated with each other or with the tuna arrangement. Similarly, the specific biodiversity arrangement for turtles does not appear to be integrated with the other arrangements in the LME.

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Gulf of Thailand LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Gulf of Thailand LME	Completeness	Integration	Engagement
	50%	0.1	75%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

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System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

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[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Humboldt Current LME

1 The system to be governed

The system is the Humboldt Current LME. This includes the marine waters of the Pacific Ocean extending from 5°S to 47°S under the jurisdiction of Peru and Chile, although western boundary is said to extend beyond the EEZ to FAO area 87 (UNIDO, 2003). The LME covers a surface area of over 2.5 million km^2 and is shared among the member countries as indicated in Table 1. This system shows high climatic as well as oceanographic variability associated with seasonal, inter-annual, decadal and longer-term changes, with shifts between alternating anchovy and sardine regimes, often under the influence of El Niño (Heileman et al. 2009).

Table 1. Percentage of Humboldt Current LME area taken up by the EEZ of each country and the High Seas (area = 2,536,991 km^2)

Country	Percent of LME area
Argentina	0.2
Chile	63.0
Peru	25.5
High Seas	11.3

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XVII-56), so a review is not provided here. This assessment is also informed by the Humboldt Current LME Transboundary Diagnostic Assessment (UNIDO, 2003) and the Asia Pacific Economic Cooperation Workshop IV on Large Marine Ecosystems (2013).

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
  - sub-optimal exploitation of fishery resources (over-fishing, undersized, reproductive females, under-exploitation)
  - insufficient knowledge of variability in the LME (temporal, spatial and biological production)
- Pollution
  - LBS (nutrients, sediments, metal mining and pesticides)
- Biodiversity
  - threats to biodiversity relevant to fish production
  - habitat deterioration in the coastal zone (physical alteration, dragging, use of explosives)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of elasmobranchs or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Permanent Commission of the South Pacific (CPPS) - regional maritime organization responsible for the coordination of the maritime policies of its four Member States, Chile, Peru, Colombia, Ecuador.
2. The Framework Agreement for the Conservation of Living Marine Resources in the High Seas of the Southeast Pacific (Galapagos Agreement – not yet in force)
3. The Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific (Lima Convention, 1986) - The South-East Pacific Regional Seas Programme
    a. Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific
    b. 3 Pollution Protocols – Hydrocarbon spills (1987), LBS (1986), radioactive (1995)
    c. 1 Biodiversity Protocol – Management of marine and coastal protected areas (1994)
4. South Pacific Regional Fisheries Management Organization (SPRFMO) – area of LME that includes the high seas
5. Latin American Organization for Fisheries Development (OLDEPESCA)
6. Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)
7. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
8. Action Plan for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Humboldt Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Humboldt Current LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Permanent Commission for the South Pacific (CPPS)	27	100	C
Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)	3	87	D
Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific - The Lima Convention (Lima)	36	92	D
Latin American Organization for Fisheries Development (OLDEPESCA)	7	20	D
Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean (SPRFMO)	<1	10	D
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the Humboldt Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Humboldt Current LME										
LME coastal countries	Agreement									
	Lima	Lima-LBS	Lima-Hydrocarbons	Lima-radioactive	Lima-Management CMPAs	IATTC	OLDEPESCA	SPRFMO	CPPS	IAC
Argentina	N	N	N	N	N	N		N	N	B
Chile	B	B	B	B	B	N		B	B	B
Peru	B	B	B	B	B	B	B	C	B	B
% engagement	100	100	100	100	100	100	33	50	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed										

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in table 5

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Humboldt Current LME[i] – Transboundary Arrangements for fisheries – Straddling (ABNJ species excluding tunas)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	Supra-LME	3	OLDEPESCA for the northern portion of the LME involving Peru as Chile is not a member of OLDEPESCA	Chile is a member but not Peru How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	SPRFMO - Commission	Supra-LME	3		
Planning analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	Supra-LME	3		
Planning decision-making	SPRFMO - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	SPRFMO – Compliance and Technical Committee	Supra-LME	3		
Data and information	Countries SPRFMO – Scientific Committee	National Supra-LME	2		
Overall total and % completeness >>			17/21 = 81%		

Table 4b: Humboldt Current LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	LME	3	OLDEPESCA	In the case of OLDEPESCA, the geographic area of competence only extends to Peru. How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	CPPS - Assembly	LME	2		
Planning analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	LME	3		
Planning decision-making	CPPS – Executive Committee	LME	2		
Implementation	Countries	National	2		
Review and evaluation	CPPS – Executive Committee	LME	2		
Data and information	Countries Secretariat	National LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4c: Humboldt Current LME – Transboundary Arrangements for fisheries – HMS (tuna and tuna-like species)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3		Chile is not a member of the IATTC How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	IATTC - Commission	LME	3		
Planning analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3		
Planning decision-making	IATTC - Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	Committee for the Review of Implementation of Measures Adopted by the Commission	LME	3		
Data and information	Secretariat Countries	LME/National	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d: Humboldt Current LME – Transboundary Arrangements for Pollution – LBS (Lima LBS Protocol) and MBS ((Lima Oil Spill and Radioactive Protocols)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project includes Chile and Peru but also the other countries in the Lima Convention area.	Additional countries to those bordering the LME are also members of CPPS, including Ecuador, Colombia and Panama but Argentina is not a member. Given the size of patrimony in the LME held by Argentina, this is not a likely big issue. All 5 CPPS countries are members of all of the Lima Convention Protocols. Curiously Panama is not a party to the Convention but is a member of its Action Plan and all of its protocol. How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4e: Humboldt Current LME – Transboundary Arrangements for Biodiversity - CMPAs and habitat deterioration (Lima Protocol on Management of coastal and marine protected areas)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project includes Chile and Peru but also the other countries in the Lima Convention area.	Additional countries to those bordering the LME are also members of CPPS, including Ecuador, Colombia and Panama but Argentina is not a member. Given the size of patrimony in the LME held by Argentina, this is not a likely big issue. All 5 CPPS countries are members of all of the Lima Convention Protocols. Curiously Panama is not a party to the Convention but is a member of its action plan and all of its protocol. How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f: Humboldt Current LME – Transboundary Arrangements for Biodiversity - Turtles					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Humboldt Current LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** Argentina, Chile, Peru		**System name:** Humboldt Current		**Region:** Southeast Pacific
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – Straddling (ABNJ excluding tunas)	3		81%		
Fisheries –EEZ	3		78%		
Fisheries – HMS (tuna) in the northern part of the LME	3		86%		
Pollution – LBS	3		62%		
Pollution – MBS	3		62%		
Pollution - MBS	3		62%		
Biodiversity - CMPAs and habitat deterioration	3		62%		
Biodiversity – Specific (Turtles)	3		57%		
	System architecture completeness index >>		68%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	**Fisheries – Straddling (ABNJ)**	**Fisheries – EEZ**	**Fisheries - HMS**	**Pollution – LBS**	**Pollution - MBS**	**Pollution - MBS**	**Biodiversity - CMPAs and habitat modification**	**Biodiversity – Specific (Turtles)**
Policy analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Policy decision-making	SPRFMO - Commission	CPPS - Assembly	IATTC - Commission	High Contracting Parties	High Contracting Parties	High Contracting Parties	High Contracting Parties	IAC Consultative Committee and CoP
Planning analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Planning decision-making	SPRFMO - Commission	CPPS – Executive Committee	IATTC - Commission	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	IAC CoP

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	**Fisheries – Straddling (ABNJ)**	**Fisheries – EEZ**	**Fisheries - HMS**	**Pollution – LBS**	**Pollution - MBS**	**Pollution - MBS**	**Biodiversity - CMPAs and habitat modification**	**Biodiversity – Specific (Turtles)**
Implementation	Countries	Countries	Countries	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	IAC Countries
Review and evaluation	SPRFMO – Compliance and Technical Committee	CPPS – Executive Committee	Committee for the Review of Implementation of Measures Adopted by the Commission	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	IAC Countries
Data and information	Countries SPRFMO – Scientific Committee	Countries Secretariat	Secretariat Countries	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	1	1	1	0.71
4 and 6	0	1	0	1	1	1	1	0.71
4 and 7	0	1	0	1	1	1	1	0.71
4 and 8	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	1	0	1	1	1	1	0.71
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.71
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0	0.21	0	0.21	0.21	0.21	0.21	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.2 out of a possible 1.

3 Conclusions

The arrangements for major issues within the jurisdiction of the countries are well integrated with both the CPPS and the Lima Convention and its protocols having formal linkages. However, the two arrangements for high seas fisheries (IATTC and SPRFMO) do not appear to have any formal linkages with each other or with the "within country" arrangements for fisheries, pollution and biodiversity. Nevertheless, this LME has been assigned an overall integration score of 1.0 due to the presence of the Permanent Commission for the South Pacific (CPPS) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Humboldt Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Humboldt Current LME	Completeness	Integration	Engagement
	68%	1.0	88%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Iberian Coastal LME

1 The system to be governed

The system is the Iberian Coastal LME. It is a continental shelf region of the Eastern Atlantic Ocean with surface area of about 302,000 km^2 bordered by primarily by Spain and Portugal (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 40), so a review is not provided here.

Table 1. Percentage of Iberian Coastal LME area taken up by the EEZ of each country and the High Seas (area = 302,000 km^2)

Country (N to S)	Percent of LME area
France	0.8
Portugal	52.8
Spain	46.3
High Seas	0.2

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 40 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - increasing number of collapsed stocks and commercially exploited stocks
- Pollution
  - increasing frequency and intensity of HABs (localized - restricted to estuaries and coastal lagoons); anthropogenic inputs and fluxes of nitrogen into areas susceptible to eutrophication
- Climate Change
  - coastal erosion; salt water intrusion into estuaries, coastal lagoons, wetlands and groundwater as sea level rises

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Fishery Committee for the Eastern Central Atlantic (CECAF)
2. Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean (COMHAFAT)
3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)

4. International Council for the Exploration of the Sea (ICES)
5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. North-East Atlantic Fisheries Commission (NEAFC)
8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
9. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
10. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
11. European Union Common Fisheries Policy (CFP)
12. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Iberian Coastal LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Iberian Coastal LME (area =302,294 km^2)

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Fishery Committee for the Eastern Central Atlantic (CECAF)	<1	<1	D
Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean (COMHAFAT)	<1	<1	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
International Council for the Exploration of the Sea (ICES)	2	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	1	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	100	C
North-East Atlantic Fisheries Commission (NEAFC)	2	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	2	99	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	13	92	D
European Union Common Fisheries Policy (CFP)	8	100	C
European Union Maritime Policy	8	100	C

[1]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Iberian Coastal LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Iberian Coastal LME

Coastal countries in the LME	Agreements							
	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	ASCO-BANS	EU-CFP
France	B	B				B	B	B
Portugal		B				B	C	B
Spain		B				B	C	B
% engagement	33	100	0	0	0	100	33	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-h. They are summarised in table 5.

Table 4a: Iberian Coastal LME[i] – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Iberian Coastal LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Iberian Coastal LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Iberian Coastal LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: Iberian Coastal LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3		
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Iberian Coastal LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4g: Iberian Coastal LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4h: Iberian Coastal LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Iberian Coastal LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries:** France, Portugal, Spain		**System name:** Iberian Coastal LME		**Region:** North East Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Fisheries – EEZ	3		90%		CFP
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution – MBS	3		38%		Bonn
Biodiversity – Small Cetaceans	3		62%		ASCOBANS
	System architecture completeness index >>		74%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-h) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)									
Policy cycle stage	**Fisheries - Salmon**	**Fisheries – marine mammals**	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution – MBS**	**Pollution - MBS**	**Biodiversity - Specific**
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - PEMAS ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Bonn Agreement – Contracting Parties	ASCOBANS Advisory Committee
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Contracting Parties	ASCOBANS Advisory Committee
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Contracting Parties Scientific, Technical and Economic Committee for Fisheries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Contracting Parties	Contracting Parties

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)									
Policy cycle stage	**Fisheries - Salmon**	**Fisheries – marine mammals**	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution – MBS**	**Pollution - MBS**	**Biodiversity - Specific**
					(STECF) and its Expert Working Groups (EWGs)				
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	Commission STECF	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Meeting of the Parties	Meeting of the Parties
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Contracting Parties Commission STECF Advisory Councils	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Contracting Parties	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.03 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Given that all coastal countries in this LME are within the European Union the EU CFP may provide an additional level of integration among fisheries bodies and between fisheries and environmental issues. A such, this LME has been assigned an overall integration score of 1.0 due to the presence of the European Union Maritime Policy with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Iberian Coastal LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Iberian Coastal LME	Completeness	Integration	Engagement
	74%	1.0	44%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009.The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Iceland Shelf LME

1 The system to be governed

The system is the Iceland Shelf LME. It has a surface area of 489,000 km^2. It primarily surrounds the island-nation of Iceland, accounting for about 80% of Iceland's EEZ and the remainder within the marine waters of Greenland, Norway and the High Seas. (Table 1)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIX - 41), so a review is not provided here.

Table 1. Percentage of Iceland Shelf LME area taken up by the EEZ of each country and the High Seas (area = 489,000 km^2)

Country (N to S)	Percent of LME area
Denmark (Greenland)	11.8
Iceland	81.2
Norway (Jan Mayen)	6.8
High Seas	0.3

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 41 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - overexploited stocks (cod, capelin)
- Pollution
  - (LBS) negligible in fishing grounds; occasional sewage contamination (localized)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. North-East Atlantic Fisheries Commission (NEAFC)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Iceland Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Iceland Shelf LME (area = 489,875 km^2)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	2.4	88.3	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	3	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	2	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	2	100	C
North-East Atlantic Fisheries Commission (NEAFC)	4	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	4	100	C

The extent of country membership in these bodies and instruments for the Iceland Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Iceland Shelf LME							
Coastal countries in the LME	Agreements						
	AC	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR
Denmark (Greenland)	C			B	B	B	B
Iceland	C	B	B	B	B	B	B
Norway (Jan Mayen)	C	B	B	B	B	B	B
% engagement	100	67	67	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed							

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Iceland Shelf LME[I] – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4b. Iceland Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Iceland Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Iceland Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Iceland Shelf LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Iceland Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5: Iceland Shelf LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Denmark, Norway, Iceland**	**System name: Iceland Shelf LME**		**Region: Arctic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (marine mammals)	3		71%		NAMMCO
Fisheries – specific (salmon)	3		57%		NASCO
Pollution (LBS)	3		90%		OSPAR
Pollution (LBS)	3		67%		AC
Pollution (MBS)	3		67%		AC
Pollution (MBS)	3		90%		OSPAR
Biodiversity – General	3		90%		OSPAR
Biodiversity – General	3		67%		AC
	System architecture completeness index >>		78%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a – 4f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	OSPAR – Eutrophicatio n Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on Management and Science	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	OSPAR – Eutrophicatio n Strategy Hazardous Substances	OSPAR - Offshore Industry Strategy Committee	OSPAR - Biodiversity and Ecosystem Committee	Arctic Council - Arctic Contaminants Action Program;	Arctic Council - Emergency preparedness, Prevention and response;	Arctic Council Conservation of Arctic Flora and Fauna; SD Working

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	(PEMAS) ICES				Radioactive Substances Committees and Working Groups	and Working Groups	and Working Groups	Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries	Countries
Review and evaluation	NEAFC - Permanent Committee on	Conservation and Management	NASCO Council	NAMMMCO Council Committee on	OSPAR Commission, Main	OSPAR Commission, Main	OSPAR Commission, Main	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries – Specific (salmon)**	**Fisheries - Specific (Marine Mammals)**	**Pollution – LBS,**	**Pollution - MBS**	**Biodiversity - General**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**
	Control and Enforcement (PECCOE)	Measures Compliance Committee (CMMCC)		Inspection and Observation	Committees and Working Groups	Committees and Working Groups	Committees and Working Groups			
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.3
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.7
5 and 7	0	1	0	1	1	1	1	0.7
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.7
6 and 8	0	0	0	0	0	0	0	0

6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
8 and 9	0	1	0	1	0	1	1	0.6
8 and 10	0	1	0	1	0	1	1	0.6
9 and 10	0	1	0	1	0	1	1	0.6
Average	0.02	0.13	0.02	0.13	0.07	0.13	0.13	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the ten issues is 0.1 out of a possible 1.

3 Conclusions

None of the fisheries arrangements (NEAFC, ICCAT, NAMMCO and NASCO) appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity. Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent.

It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Iceland Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Iceland Shelf LME	Completeness	Integration	Engagement
	78%	0.1	90%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009.The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

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Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Indonesian Sea LME

1 The system to be governed

The system is the Indonesian Sea LME. It is located at the convergence of the Pacific and Indian Oceans, and is bordered by Indonesia and East Timor. It covers an area of over 2.4 million km^2 (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VIII - 12), so a review is not provided here.

Table 1. Percentage of Indonesian Sea LME area taken up by the EEZ of each country and the High Seas (area = 2,447,530 km^2)

Country	Percent of LME area
Timor-Leste	0.5
Indonesia	98.6
High Seas	0.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) as follows:

- Fisheries
  - widespread overexploitation of pelagic species (shark, tuna and billfish)
  - use of fish poisons to catch aquarium and food fishes
  - collapse of live reef fish food industry in some areas; heavily and chronically overfished coral reefs; rapid decrease in reef-based fisheries
- Biodiversity
  - threatened and endangered species (sea turtle and dugong)
  - habitat modification causing major fragmentation and reduction in mangrove
  - catastrophic damage to coral reefs from the use of explosives and poisons
- Pollution
  - LBS - coastal pollution from domestic, agricultural and industrial wastes; severe eutrophication in urban areas; severe microbiological pollution; high siltation rates; severe chemical pollution from agricultural pesticides and industries (localized); widespread mercury contamination
  - MBS - oil spills, marine debris

2.2 Identify arrangements for each transboundary issue

The Indonesian Sea LME is governed by Indonesia and the recently independent state of East Timor. The LME falls within the UNEP-administered East Asian Regional Seas Programme and within the GEF-supported PEMSEA.

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
3. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
4. Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)
5. South East Asian Fisheries Development Center (SEAFDEC)
6. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
7. Coordinating Body on the Seas of East Asia (COBSEA)
8. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
9. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
10. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
11. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
12. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Indonesian Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Indonesian Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Asia Pacific Fisheries Commission (APFIC)	17	100	C
Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)	<1	<1	D
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	3	93	D
Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)	<1	7	D
South East Asian Fisheries Development Center (SEAFDEC)	11	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	2	93	D
Coordinating Body on the Seas of East Asia (COBSEA)		100	C

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the Indonesian Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Indonesia Sea LME

LME coastal countries	Agreement								
	APFIC	FFA	SEAFDEC	WCPFC	IOTC	COBSEA	PEMSEA	IOSEA	Dugong
Indonesia	B	N	C	C	B	C	C	C	
Timor-Leste	B		N	N		N	C		
% engagement	100	0	100	0	50	100	100	50	0

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in table 5

Table 4a: Indonesian Sea LME[i] – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA IOTC	• This LME is primarily under Indonesia's jurisdiction. • Both WCPFC and IOTC have areas of competence in the LME although IOTC is only 7% of the LME. • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the Indonesian Sea LME, neither Indonesia nor Timor-Leste are members. What are the implications of this for the coastal countries in this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) and Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	Countries WCPFC Secretariat FFA	National Supra-LME	2		
Review and evaluation	WCPFC Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC - OFP	Supra-LME National	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b. Indonesian Sea LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like) in the Indian Ocean					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3	WCPFC	Only a very fraction of the LME is covered by this arrangement What role, if any, does IOTC play in the LME?
Policy decision-making	IOTC - Commission	Supra-LME	1		
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		
Planning decision-making	IOTC - Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	National Supra-LME	2		
Data and information	Countries IOTC - Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4c: Indonesian Sea LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: Indonesian Sea LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity – Habitat Modification					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4e: Indonesian Sea LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4f: Indonesian Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Indonesian Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Indonesia, Timor-Leste**		**System name: Indonesian Sea**		**Region: East Asia**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (Tuna and tuna-like)	2		90%		WCPFC
Fisheries – HMS (Tuna and tuna-like)	2		67%		IOTC
Fisheries – EEZ	2		38%		
Pollution - LBS	2		38%		
Pollution – MBS	2		38%		
Biodiversity – Habitat Modification	2		38%		
Biodiversity – Specific (Turtles)	2		52%		
Biodiversity – specific (dugong)	2		52%		CMS MOU
	System architecture completeness index >>		52%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)								
Policy cycle stage	**Fisheries – HMS**	**Fisheries – HMS**	**Fisheries – EEZ**	**Pollution LBS**	**Pollution MBS**	**Biodiversity – Hab Mod**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	IOTC - Scientific Committee Sub-commission	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	IOTC - Commission	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	IOTC - Scientific Committee Sub-commission	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	IOTC - Commission	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance	Countries IOTC - Scientific	FAO Secretariat Countries	COBSEA PEMSEA	COBSEA PEMSEA	COBSEA PEMSEA	IOSEA – sea turtle MOU	Secretariat

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)								
Policy cycle stage	**Fisheries – HMS**	**Fisheries – HMS**	**Fisheries – EEZ**	**Pollution LBS**	**Pollution MBS**	**Biodiversity – Hab Mod**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
	Committee (TCC)	committee, sub-commissions, and working parties		Executive Committee	Executive Committee	Executive Committee	Secretariat	
Data and information	SPC OFP	Countries IOTC - Secretariat	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	1	1	1	0	0	1	0	0.57
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	0	0	1	0	0.57
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.10	0.10	0.10	0	0	0.10	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is extremely low at a score of 0.1 out of a possible 1.

3 Conclusions

In this LME, there are three arrangements for fisheries in the areas, one each cover high sea highly migratory tuna and tuna-like fisheries in the Western Central Pacific (WCPFC) and the Indian Ocean (IOTC) and the remaining arrangement (APFIC, FAO) covers the fisheries within national jurisdiction. There does not appear to be any formal connection between the three arrangements, possibly as they have different areas of competence. However, it is to be expected that at some high level, the two Commissions (WCPFC and IOTC) for the large highly migratory fisheries would connect. In contrast, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However neither of the "within national jurisdiction" arrangements for fisheries or pollution/biodiversity appears to be integrated with each other or with the tuna arrangements.

The specific biodiversity arrangement for turtles (IOSEA) does not appear to be integrated with any of the other arrangements in the LME. Further, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in other intergovernmental partnerships or with each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Indonesia Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Indonesia Sea LME	Completeness	Integration	Engagement
	52%	0.1	56%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Kuroshio Current LME

1 The system to be governed

The system is the Kuroshio Current LME. This includes the marine waters of the countries shown in Table 1 and a small proportion of High Seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-23), so a review is not provided here. This assessment is also informed by the Northwest Pacific Action Plan (UNEP 1994) and the NOWPAP website.

Table 1. Percentage of Kuroshio Current LME area taken up by the EEZ of each country and the High Seas (area = 1,317,095 km^2)

Country	Percent of LME area
Japan	92.9
Philippines	0.9
Taiwan	3.6
High Seas	2.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary issues to be governed

Although this is a transboundary LME (Table 1), the majority of the LME lies within Japan's EEZ. Therefore, there are few significant transboundary issues to be addressed by governance in this LME. Fisheries are important in this area, but their management is for the most part at the national level, by Japan (Makino 2011). The main transboundary stocks are tunas and billfishes. Whereas, the area covered by the West Central Pacific Fisheries Commission (WCPFC), which has the mandate for management of these species in the western Pacific, does cover the Kuroshio Current LME (Table 2), the fisheries that it manages cannot be said to be a significant issue in this LME. Therefore the relevance of the WCPFC to the LME is moderate. However, it can be said that an arrangement for highly migratory species is in place for the tuna and billfish stocks in this LME.

Biodiversity issues identified by Sherman and Hempel (2009) for this LME are primarily Japanese national issues. Pollution issues affecting marine waters are all considered to be transboundary.

The transboundary issues identified as requiring governance arrangements are:

- Fisheries– HMS may be the only significant transboundary issue
- Pollution – LBS and MBS

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. UNEP Northwest Pacific Action Plan – NOWPAP
    a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
    b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
    c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
    d. Data and Information Network RAC- DINRAC, Beijing, China
2. The North Pacific Marine Science Organization (PICES)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)[1]
5. Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region, 1994

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Kuroshio Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Kuroshio Current LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[2]
APFIC	<1	4	D
PICES	3	54	D
WCPFC	1	100	C
NOWPAP		100	C

The extent of country membership in these bodies and instruments for the Kuroshio Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Kuroshio Current LME

Coastal countries in the LME	Agreements				
	APFIC	APEC-OFWG	PICES	WCPFC	NOWPAP
Japan	B	C	B	B	C
Philippines	B	C	N	B	N
Taiwan	N	N	N	N	N

[1]Merger of former Marine Resource Conservation and Fisheries Working Groups

[2]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

% engagement	100	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-b. These are summarized in Table 5.

Table 4a: Kuroshio Current LME[i] – Transboundary arrangement for fisheries – Highly Migratory Species					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN	• Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The FFA oversees the implementation of several treaties and agreements relating to HMS (Nauru Agreement, Niue Treaty, Multilateral NTSA Agreement on Strengthening Implementation of the Niue Treaty, Wellington Convention, Palau Arrangement, U.S Treaty). • Scores are for WCPFC, except D and I which is for SPC. • The role of the SPRFMO in high seas fisheries and biodiversity relative to that of the WCPFC is unclear.
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME National	2		
Review and evaluation	WCPFC Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: Kuroshio Current LME – Transboundary arrangement for pollution – LBS and oil spills					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		• CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. • MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. • POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Kuroshio Current LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** Japan, Philippines, Taiwan		**System name:** Kuroshio Current LME		**Region:** North West Pacific
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – Highly Migratory Species	3		90		
Pollution – LBS	3		38		
Pollution –MBS	3		38		
	System architecture completeness index >>		56%		<< System priority for intervention

2.3 Assessment of transboundary integration of arrangements within the system

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4)		
Policy cycle stage	**Fisheries - HMS**	**Pollution - LBS and oil spills**
Policy analysis and advice	PICES, APEC-OFWG	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	Countries	NOWPAP-IGM
Planning analysis and advice	PICES, APEC-OFWG	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	Countries	NOWPAP-IGM
Implementation	Countries	Countries
Review and evaluation	Countries	CEARAC, MERRAC
Data and information	PICES	DINRAC, MERRAC, CEARAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	0	1	1	0.9
Average	0.3	0.3	0.3	0.3	0.0	0.3	0.3	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.3 out of a possible 1.

The high integration among arrangements 2 and 3 arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal. There does not appear to be any integration between the two arrangements. Nor could any organization be found with a mandate to integrate transbounbdary marine issues for this LME.

3 Conclusions

In this LME, the fact that there is no regional seas convention covering the area, but only an action plan, seriously weakens capacity for transboundary governance in areas relating to pollution. Further, there is no indication of transboundary integration, other than through cooperation in science. There is the potential for integration of pollution issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any other transboundary organisation than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Kuroshio Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Kuroshio Current LME	Completeness	Integration	Engagement
	56%	0.3	100%

4 References

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Mediterranean Sea LME

1 The system to be governed

The system is the Mediterranean Sea LME. This includes the marine waters of the entire Mediterranean Sea (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter IV-7), so a review is not provided here. This assessment is also informed by the TDA, SAP MED, SAP BIO (UNEP, 1999; UNEP- MAP-RAC/SPA, 2003; UNEP-MAP-MEDPOL, 2005; UNEP-MAP 2011, 2012) and the institutional review by the GEF (GEF 2011).

Table 1. Percentage of Mediterranean Sea LME area taken up by the EEZ of each country and the High Seas[1] (area = 2,506,350 km^2)

Country	Percent of LME area
Albania	0.4
Algeria	5.1
Croatia	2.2
Cyprus	3.9
Egypt	6.7
France	3.5
Greece	19.5
Israel	1.1
Italy	21.2
Lebanon	0.8
Libya	14.0
Malta	2.2
Monaco	<0.1
Morocco	0.7
Montenegro	0.3
Slovenia	<0.1
Spain	10.3
Syria	0.4
Tunisia	4.0
Turkey	3.3
United Kingdom	<0.1
High Seas	0.2

The figures shown in this table are based on the EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were initially identified in the TDA for the Mediterranean Sea (UNEP-MAP-MEDPOL 2005) and updated based on more recent policy documents, such as new Protocols of the Barcelona Convention:

- Decline in fisheries
    - Fisheries for shared demersal fishes and invertebrates
    - Fisheries for shared small pelagics
    - Fisheries for tunas and tuna-like species
- Decline in seawater quality
    - Land-bases sources of pollution
        - Industrial
        - Agricultural
        - Municipal sewage
    - Marine based sources of pollution
    - Long-range atmospheric sources of pollution

[1]Assuming each country claims its EEZ to the fullest extent possible given proximity of other countries

- Long-range transport of PTS in seabirds

- Human health risks
  - Microbiological and chemical contamination of food
  - Risks from bathing in contaminated seawater
  - Risks from contaminated beach sand

- Biodiversity and degradation of natural resources
  - Overexploitation of coastal resources;
  - Conversion and degradation of critical habitats;
    - Management of marine and coastal protected areas, biodiversity and ecosystems
    - Protection of endangered species and habitats
  - Introduction of alien species;
  - Pollution in the form of excess nutrients; toxic waste, including oil; solid waste and litter

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) 1975, revised 1995.
   a. Mediterranean Action Plan,1975 revised in 1995 with its operational programmes and Regional activity centres addressing
      i. pollution assessment and control (MEDPOL and REMPEC)
      ii. environment and development interaction and climate change (Plan Bleu et PAP RACs)
      iii. marine protected areas and biodiversity (RAC SPA)
      iv. sustainable consumption and production (SCP RAC)
   b. Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea (Barcelona Dumping Protocol) 1975, revised 1995
   c. Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (LBS Protocol) 1980, revised 1996
      i. The Strategic Action Programme to eliminate pollution from land-based sources in the Mediterranean (SAP MeD), the GEF Transboundary Diagnostic Analysis for the Mediterranean Sea and the National Action Plans (NAPs) 1997

d. Protocols Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol)[2]

e. Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil (Offshore Protocol) 1994

f. Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (Hazardous Wastes Protocol) 1996

g. Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (1999)(SPA and Biodiversity Protocol) 1995

   i. The Strategic Action Programme for the Conservation of Biological Diversity in the Mediterranean region (SAP BIO), and related National Action Plans (NAPs), 2003

h. Protocol on Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol) 2008

2. The Mediterranean Commission on Sustainable Development (MCSD) established in the framework of UNEP/MAP
3. Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area (CMS/ACCOBAMS)
4. Agreement for the Establishment of the General Fisheries Commission for the Mediterranean (GFCM)
5. The International Convention for the Conservation of Atlantic Tunas (ICCAT)
6. The Euro-Mediterranean Partnership (EMP) and Barcelona Process, relaunched in 2008 as the Union for the Mediterranean (UfM)[3]
7. GEF/UNEP-MAP strategic Partnership for the Mediterranean Large Marine Ecosystem
   a. Mediterranean Environmentally Sustainable Development Programme (Sustainable Med)
8. Mediterranean Action Plan - Strategic Action Programme to Address Pollution from Land-Based Activities, 1998 (SAPMED)
9. Strategic Action Programme for the Conservation Of Biological Diversity (Sap Bio) in the Mediterranean Region, 2003 (SAPBIO)

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[2] There are two separate protocols, the original in 1975 and the new protocol in 2002

[3] The EMP includes EU, North African and Middle East States on the Mediterranean and goes far beyond marine EBM to include, for example, trade, transport, education, alternative energy and civil society http://eeas.europa.eu/euromed/index_en.htm.

10. Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean, 1995 (Mediterranean Action Plan or MAP Phase II, replacing the MAP 1975)
11. European Union Common Fisheries Policy (CFP)
12. European Union Integrated Maritime Policy (IMP)

An account of the many regional and subregional arrangements that have bearing on the marine environment and resources is provided by (Scoullos and Ferragina 2010)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Mediterranean Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Mediterranean Sea LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[4]
Barcelona Convention and Protocols	99	100	A
GFCM	84	100	C
ICCAT	3	100	C
ACCOBAMS		100	C
EU CFP	44	63	D
EU IMP	44	63	D

The extent of country membership in these bodies and instruments for the Mediterranean Sea LME is shown in Table 3.

[4]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Mediterranean Sea LME (http://195.97.36.231/dbases/webdocs/BCP/StatusOfSignaturesAndRatifications.doc)

Coastal countries in the LME	Agreements													
	Barcelona Convention	Barcelona-Dumping Protocol	Barcelona - LBS Protocol	Barcelona- Prevention\ Emergency Protocol 1976	Barcelona- Prevention\ Emergency Protocol 2002	Barcelona-Offshore Protocol	Barcelona-Hazardous Wastes	Barcelona - SPA Protocol	Barcelona –ICZM Protocol	ACCOBAMS	GFCM 2004	ICCAT	EU-CFP	EU-IMP
Albania	B	B	B	B		B	B	B	B	B	B	B	N	N
Algeria	B	B	B	B			B	B	C	B	B	B	N	N
Bosnia Herzegovina	B	B	B	B									N	N
Croatia	B	B	B	B	B	B		B	B	B	B	B	B	B
Cyprus	B	B	B	B	B	B		B		B	B	B	B	B
Egypt	B	B	B	B			B	B		B		B	N	N
France	B	B	B	B	B			B	B	B	B	B	B	B
Greece	B	B	B	B	B	B	B		C	B	B		B	B
Israel	B	B	B	B		B			C				N	N
Italy	B	B	B	B		B	B	B	C	B	B	B	B	B
Lebanon	B	B	B	B				B		B	B		N	N
Libya	B	B	B	B		B	B			B	B	B	N	N
Malta	B	B	B	B	B	B	B	B	C	B	B	B	B	B
Monaco	B	B	B	B	B	B	B	B	C	B	B		N	N
Morocco	B	B	B	B	B	B	B	B	B	B	B	B	N	N
Montenegro	B		B		B		B	B	B	B	B		B	B
Slovenia	B	B	B	B	B	B		B	B	B	B		B	B
Spain	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Syria	B	B	B	B	B	B	B	B	B	B		B	N	N
Tunisia	B	B	B	B		B	B	B	C	B	B	B	N	N
Turkey	B	B	B	B	B		B	B			B	B	B	B
EU	B	B	B	B	B	B	B	B	B					
% engagement	100	95	100	95	59	67	67	90	67	86	81	67	100	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption; C = agreement to cooperate by signing; N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-f. These are summarized in Table 5.

Table 4a:Mediterranean Sea LME[i] – Transboundary arrangement for fisheries–demersal fishes, invertebrates and small pelagics					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	GFCM Scientific Advisory Committee (SAC) GFCM Compliance Committee (CoC)	Supra-LME	3		• These issues are all combined as they are subject to the same governance processes carried out by the same organisations • Decisions include measures for conservation of cetaceans and Mediterranean monk seal.
Policy decision-making	GFCM Commission	Supra-LME	3		
Planning analysis and advice	Scientific Advisory Committee (SAC) Compliance Committee (CoC)	Supra-LME	3		
Planning decision-making	GFCM Commission	Supra-LME	3		
Implementation	Contracting Parties, Secretariat	Supra-LME National	2		
Review and evaluation	Compliance Committee (CoC)	Supra-LME	3		
Data and information	CPs, GFCM Secretariat, GFCM Committees	Supra-LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4b: Mediterranean Sea LME – Transboundary arrangement for fisheries –Large pelagic fishes (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		• The GFCM reviews ICCAT decisions that are relevant to stocks in the Mediterranean and adopt them as appropriate. • The ICCAT/GFCM WG on Large Pelagic Species in the Mediterranean pays particular attention to stocks of small tunas that are not commonly assessed by ICCAT. • Only five non-EU countries are ICCAT members. EU countries are sometimes represented in ICCAT by the EU.
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels ICCAT/GFCM WG on Large Pelagic Species in the Mediterranean	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Mediterranean Sea LME – Transboundary arrangement for pollution – Land based sources (LBS)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Barcelona Convention LBS Protocol Secretariat MEDPOL Programme Blue Plan Regional Activity Centre (BP/RAC)	LME	2		• The human health risk issue is also considered to be covered by this arrangement
Policy decision-making	Barcelona Convention LBS Protocol COP Barcelona Convention COP	LME	3		
Planning analysis and advice	Barcelona Convention Protocol Secretariat	LME	2		
Planning decision-making	Barcelona Convention LBS Protocol COP	LME	3		
Implementation	CPs LBS Protocol Secretariat	National LME	2		
Review and evaluation	Barcelona Convention Protocol Secretariat	LME	2		
Data and information	Barcelona Convention LBS Protocol Secretariat	LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4d:Mediterranean Sea LME – Transboundary arrangement for pollution - Marine-based sources (MBS)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats MEDPOL REMFEC	LME	2	IMO has a worldwide regulatory mandate, any specific regulation regarding pollution from ships in the Med (for instance specially protected area) will have to be agreed at the level of IMO	• Four Barcelona convention protocols address marine-based sources of pollution: the Dumping Protocol, the Prevention and Emergency Protocol, the Offshore Protocol and the Hazardous Wastes Protocol. • While these are supported by different technical groups and different regional activity centres, and they are combined here under single governance arrangement. However, if the processes relating to these protocols are quite separate they should be separated into different arrangements • For practical purposes dumping and HW may also be considered as land based sources and not sea based sources. The pollution is often not generated at sea but on land. Under MARPOL they are however treated as MBS.
Policy decision-making	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs Barcelona Convention COP	LME	3		
Planning analysis and advice	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats Appropriate RACs	LME	2		
Planning decision-making	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs	LME	3		
Implementation	CPs Barcelona Convention Protocol Secretariats	National LME	2		
Review and evaluation	Barcelona Convention Protocol Secretariats	LME	2		
Data and information	Barcelona Convention Protocol Secretariats, Appropriate RACs	LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4e: Mediterranean Sea LME – Transboundary arrangement for degradation of natural resources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**[5]		
Policy analysis and advice	Barcelona Convention SPA/BIO, ICZM and Offshore Protocol Secretariats, PAP/RAC and SPA/RAC	LME	2	ACCOBAMS Secretariat (Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area)	
Policy decision-making	Barcelona Convention SPA/BIO and ICZM Protocol COP Barcelona Convention COP	LME	2		
Planning analysis and advice	Barcelona Convention SPA/BIO and ICZM Protocol Secretariat PAP/RAC and SPA/RAC	LME	2		
Planning decision-making	Barcelona Convention SPA and ICZM Protocol COPs	LME	2		
Implementation	CPs SPA and ICZM Protocol Secretariats	National LME	1.5		
Review and evaluation	CPs Barcelona Convention PAP/RAC and SPA/RAC	LME	2		
Data and information	CPs Barcelona Convention PAP/RAC and SPA/RAC	LME	2		
Overall total and % completeness >>			13.5/21 = 64%		

[5] Average scores for SPA and ICZM Protocols

Table 4f: Mediterranean Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5 provides a summary of the assessment of transboundary issues.

Table 5: Mediterranean Sea LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** see table 1		**System name:** Mediterranean Sea		**Region:** North Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – demersal fishes, invertebrates and small pelagics	20		96		GFCM
Fisheries – large pelagics (tunas and tuna-like species)	20		86		ICCAT
Fisheries - EEZ	20		90		EU - CFP
Pollution – LBS	20		76		UNEP/MAP, Barcelona Convention Protocols
Pollution – MBS LBS (Dumping)	20		76		
Pollution – MBS LBS (Offshore)	20		76		
Pollution – MBS LBS (Hazardous)	20		76		
Pollution – MBS (Emergency)	20		76		
Degradation of natural resources	20		64		
	System architecture completeness index >>		78%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 5)						
Policy cycle stage	**Fisheries – demersal fishes, invertebrates and small pelagics**	**Fisheries – large pelagics**	**Fisheries - EEZ**	**Pollution -– LBS**	**Pollution – MBS**	**Degradation of natural resources**
Policy analysis and advice	GFCM Scientific Advisory Committee (SAC)	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Barcelona Convention LBS Protocol Secretariat Blue Plan Regional Activity Centre (BP/RAC)	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats Appropriate RACs	Barcelona Convention SPA and ICZM Protocol Secretariats, PAP/RAC and SPA/RAC
Policy decision-making	GFCM Compliance Committee (CoC)	ICCAT Commission	European Commission	Barcelona Convention LBS Protocol COP Barcelona Convention COP	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs Barcelona Convention COP	Barcelona Convention SPA and ICZM Protocol COP Barcelona Convention COP
Planning analysis and advice	GFCM Commission	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Barcelona Convention Protocol Secretariat	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats Appropriate RACs	Barcelona Convention SPA and ICZM Protocol Secretariat PAP/RAC and SPA/RAC
Planning decision-making	Scientific Advisory Committee (SAC)	ICCAT/GFCM WG on Large Pelagic Species in the Mediterranean	European Commission	Barcelona Convention LBS Protocol COP	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs	Barcelona Convention SPA and ICZM Protocol COPs
Implementation	Compliance Committee (CoC)	ICCAT Commission	Contracting Parties Scientific, Technical and Economic	CPs LBS Protocol	CPs Barcelona Convention	CPs SPA and ICZM Protocol

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 5)						
Policy cycle stage	**Fisheries – demersal fishes, invertebrates and small pelagics**	**Fisheries – large pelagics**	**Fisheries - EEZ**	**Pollution -– LBS**	**Pollution – MBS**	**Degradation of natural resources**
			Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Secretariat	Protocol Secretariats	Secretariats
Review and evaluation	GFCM Commission	Countries	Commission STECF	Barcelona Convention Protocol Secretariat	Barcelona Convention Protocol Secretariats	CPs Barcelona Convention PAP/RAC and SPA/RAC
Data and information		SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	Contracting Parties Commission STECF Advisory Councils	Barcelona Convention LBS Protocol Secretariat	Barcelona Convention Protocol Secretariats, Appropriate RACs	CPs Barcelona Convention PAP/RAC and SPA/RAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	1	1	0	0	0	0.3
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	1	1	1	1
3 and 5	1	1	1	1	1	1	1	1
3 and 6	1	1	1	1	1	1	1	1
3 and 7	1	1	1	1	1	1	1	1
3 and 8	1	1	1	1	1	1	1	1
3 and 9	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
4 and 7	1	1	1	1	1	1	1	1
4 and 8	1	1	1	1	1	1	1	1
4 and 9	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	1	1	1	1	1	1	1	1
5 and 8	1	1	1	1	1	1	1	1
5 and 9	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	1	1	1	1	1	1	1	1
6 and 9	0	0	0	0	0	0	0	0
7 and 8	1	1	1	1	1	1	1	1
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is (0.4 out of a possible 1). The two arrangements for fisheries are connected through a joint technical committee. The arrangements for pollution and biodiversity all fall under the Barcelona Convention. These two sets of arrangements (Fisheries and Barcelona Convention) are integrated through an MOU.

A formal integrating mechanism is considered to be important if EAF or EBM are to be achieved. The Mediterranean Commission on Sustainable Development (MCSD) is the only separate integrating mechanism that could be identified for the entire Mediterranean Sea. The EU Integrated Maritime Policy does seek to integrate marine matters within the waters of the EU countries but only covers 63% of the Mediterranean. However, the pursuit of the Ecosystem Approach within the UNEP-MAP, that includes fisheries, is an indication of intent and progress with integration (UNEP/MAP, 2012).

3 Conclusions

Given the semi-enclosed nature of this LME, the fit of arrangements to the LME is very close, with two extending also to the Black Sea, and one (ICCAT) extending an Atlantic ocean-wide. The fact that decisions taken in ICCAT are not binding, seriously weakens this arrangement. However, the uptake of recommendations by the GFCM strengthens them in the Mediterranean. The Barcelona Convention and its protocols provide a strong framework for addressing land and marine-based sources of pollution as well as biodiversity issues. A strength of the Specially Protected Areas and Biodiversity Protocol is that it applies to areas beyond national jurisdiction. The need for an integrating mechanism is recognized by the countries in the establishment of the Mediterranean Commission on Sustainable Development. However, it appears to be a consultative body that is largely advisory in nature rather than having any formal coordination mandate.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Mediterranean Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Mediterranean Sea LME	Completeness	Integration	Engagement
	78%	1.0	85%

This LME has been assigned an overall integration score of 1.0 due to the presence of the Mediterranean Commission on Sustainable Development (MCSD) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

4 Acknowledgements

We are grateful for review and comments provided by Virginie Hart, Souha El Asmi and Frederic Hebert. These reviewers provided a wealth of additional information that could take the scope of this assessment beyond governance architecture and into governance performance and effectiveness. For reference this material is provide below.

- The 2009 SAP BIO updating on Climate Change issues (3 sub-regional reports and a regional synthesis: Arab countries: http://www.rac-spa.org/sites/default/files/doc_climate_change/ccc_med_arab.pdf ; Adriatic countries: http://www.rac-spa.org/sites/default/files/doc_climate_change/cca_med_adriatic.pdf; European non-Adriatic countries and Israel : http://www.rac-spa.org/sites/default/files/doc_climate_change/ccb_north_med_non_adriatic_and_israel.pdf; and Regional synthesis report: http://www.rac-spa.org/sites/default/files/doc_climate_change/ccd_synthesis.pdf).
- Technical reports compiled in the framework of the RAC/SPA Project on SPAMIs in the open seas 'MedOpenSeas': http://www.rac-spa.org/node/1031 :
  Report presenting a georeferenced compilation on bird important areas in the Mediterranean open seas: http://medabnj.rac-spa.org/images/stories/Publications/bird_important_areas.pdf
- Fisheries conservation and vulnerable ecosystems in the Mediterranean open seas, including the deep seas: http://www.rac-spa.org/publications/#en1.1
- Overview of scientific findings and criteria relevant to identifying SPAMIs in the Mediterranean open seas, including the deep seas: http://medabnj.rac-spa.org/images/stories/Publications/overview_report.pdf
- International legal instruments applied to the conservation of marine biodiversity in the Mediterranean region and actors responsible for their implementation and enforcement: http://medabnj.rac-spa.org/images/stories/Publications/international_legal_instrument.pdf
- Technical report on the Geographical Information System developed for the Mediterranean open seas: http://medabnj.rac-spa.org/images/stories/Publications/gis_report.pdf

- The 2003 SAP BIO adopted document could be found in the four Barcelona convention official languages at the following links: ENG: http://sapbio.rac-spa.org/sapbioeng.pdf, FRA: http://sapbio.rac-spa.org/sapbiofr.pdf, ARA: http://sapbio.rac-spa.org/sapbioara.pdf, ESP: http://sapbio.rac-spa.org/sapbioesp.pdf.
- Others in the publication section of RAC/SPA (www.rac-spa.org) website: http://www.rac-spa.org/publications#en14.

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UNEP-MAP. 2012a. Support to the Barcelona Convention for the Implementation of the Ecosystem Approach, including the establishment of MPAs in open sea areas, including deep sea. UNEP, Athens, 50. p.

UNEP/MAP. 2012b. Note on the ecosystems approach process in 2012-2013 biennium. United Nations Environment Programme, Mediterranean Action Plan, Athens, Greece, 11 p.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Newfoundland-Labrador Shelf LME

1 The system to be governed

The system is the Newfoundland-Labrador Shelf LME. It has an area of about 899,000 km^2 and extends some distance off the eastern coast of Canada, encompassing the areas of the Labrador Current and the Grand Banks. Only the northern portion of this LME, the Labrador shelf, lies within the Arctic area of Canada. Canada and France (the islands of St. Pierre and Miquelon) share jurisdiction of this LME (Table 1)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIX - 59), so a review is not provided here.

Table 1. Percentage of Newfoundland-Labrador Shelf LME area taken up by the EEZ of each country and the High Seas (area = 899,000 km^2)

Country	Percent of LME area
Canada	86.4
France	0.9
High Seas	12.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 59 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - commercially exploited fish species (cod, haddock, salmon etc)
- Pollution
  - (MBS) oil and gas industry's exploitation

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Newfoundland-Labrador Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Newfoundland-Labrador Shelf LME (area = 899,482 km^2)

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	14	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	4	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	4	100	C

The extent of country membership in these bodies and instruments for the Newfoundland-Labrador Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Newfoundland-Labrador Shelf LME

Coastal countries in the LME	Agreements			
	ICCAT	NAFO	NAMMCO	NASCO
Canada	B	B		B
France (Saint Pierre and Miquelon	B	B		
% engagement	100	100		50

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in Table 5

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a. Newfoundland-Labrador Shelf LME[i] – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Newfoundland – Labrador Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Newfoundland – Labrador Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Neither country is eligible to be full members without the expressed agreement of the 4 original signatory countries
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Newfoundland – Labrador Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Newfoundland – Labrador Shelf LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Canada, France**		**System name: Newfoundland – Labrador Shelf LME**		**Region: NW Atlantic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	2		86%		NAFO
Fisheries – large pelagics (tunas and tuna-like)	2		86%		ICCAT
Fisheries - specific (marine mammals)	2		71%		NAMMCO
Fisheries – specific (salmon)	2		57%		NASCO
Pollution – MBS (None)	2		0%		
Pollution – LBS (None)	2		0%		
	System architecture completeness index >>		50%		<< System priority for intervention

2.2.2 Issues mentioned but not addressed above:

Marine pollution from offshore oil and gas exploitation is not addressed specifically in the form of a transboundary agreement between the two countries. This is likely due to the fact that the majority of the LME is within Canada's maritime domain and as such, pollution for the industry is addressed nationally.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - Specific**	**Fisheries - Specific - Marine Mammals**
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee
Planning decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMCO Council Committee on Inspection and Observation
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

None of the four fisheries agreements (NAFO, ICCAT, NAMMCO and NASCO) have formal linkages identified across the different stages of the policy cycle.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Newfoundland-Labrador Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Newfoundland-Labrador Shelf LME	Completeness	Integration	Engagement
	50%	0	63%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the North Australian Shelf LME and Arafura-Timor Seas Project (ATSEA) Area

1 The system to be governed

The system is nominally the North Australian Shelf LME (NASLME). However, the GEF Arafura-Timor Seas (ATSEA) Project covers an area that includes this LME and extends northward the full extent of Arafura and Timor Seas to the coasts of Indonesia, Papua New Guinea, and Timor-Leste. This assessment is therefore done for both the LME and the larger ATSEA project area in parallel. The marine waters included in these areas are shown in Table 1.

Table 1. Percentage of North Australian Shelf LME area (area =774,718 km^2) and Arafura-Timor Seas Project (ATSEA) area (area =1,594,471 km^2), taken up by the EEZ of each country and the High Seas

Country	Percent of area	
	NASLME	ATSEA
Australia	99.2	59.9
Indonesia	<0.1	31.2
Papua New Guinea	<0.1	1.5
Timor-Leste		2.3
Joint management Australia-Timor Leste, Australia-PNG Australia-Indonesia		 2.2 <0.1 2.9
High Seas	0.8	0.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

An overview of the NAS LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter VIII-13), so a review is not provided here. This assessment is also informed by the ATSEA TDA, PRODOC and SAP (ATSEA 2012a, 2012b).

The emphasis in this assessment is mainly the ATSEA Project area as this is the marine ecosystem the countries in the region have selected to work with.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA (ATSEA 2012):

- Unsustainable fisheries and decline and loss of living coastal and marine resources
  - Demersal finfish and invertebrates
  - Shrimps and prawns
  - Pelagic fishes
- Marine and land-based pollution (e.g. marine debris, sediments, oil spills)
- Modification, degradation and loss of coastal and marine habitats (coral reef and associated habitats)
- Decline and loss of biodiversity and key marine species (especially turtles, dugongs, seabirds/shorebirds, sea snakes, sharks and rays via targeted harvesting or bycatch)

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified as overlapping this area and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
    a. Regional Plan of Action (RPOA) to Promote Responsible Fishing Practices (including Combating IUU Fishing) in the Region (South East Asia)
2. Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Indian Ocean Tuna Commission (IOTC)
5. Asia-Pacific Economic Cooperation (APEC)
    a. Ocean and Fisheries Working Group (OFWG)
6. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
7. UNEP Coordinating Body for the Seas of East Asia (COBSEA)
8. South East Asian Fisheries Development Center (SEAFDEC)
9. Secretariat of the Pacific Community (SPC)
10. South Pacific Regional Environmental Program (Noumea Convention) (SPREP)
11. Partnerships for the Environmental Management of the Seas of East Asia (PEMSEA)
12. Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI)
13. Indian Ocean- South East Asian Marine Turtle Memorandum of Understanding (IOSEA-MOU)
14. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
15. Agreement between the Government of Australia and the Government of the Republic of Indonesia Relating to Cooperation in Fisheries (1992 Fisheries Cooperation Agreement)
    a. Working Group on Marine Affairs and Fisheries (WGMAF)
        i. Australia-Indonesia Fisheries Surveillance Forum
16. Australian-Papua New Guinea Torres Strait Treaty
17. Strategic Action Programme for the Arafura and Timor Seas Region, 2012
18. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
19. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the North Australian Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the North Australian Shelf LME /ATSEA						
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]	Percent of agreement in ATSEA	Percent of ATSEA in agreement	Fit of agreement to ATSEA
APFIC	5	89	D	10	83	D
CCSBT	<1	21	D	1	26	D
WCPFC	1	86	D	1	73	D
FFA	1	86	D	2	73	D
IOSEA MOU		100	C		100	C
Dugong MOU						
IOTC	<1	14	D	<1	27	D
COBSEA			D	12	99	D
SEAFDEC	<1	<1	D	3	35	D

This LME is at the boundary between Pacific and Indian Ocean agreements. The extent of country membership in these bodies and instruments for the ATSEA/North Australian Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the North Australian Shelf LME /ATSEA										
Coastal countries in the LME	Agreements									
	APFIC	FFA	WCPFC	IOTC	SEAF-DEC	PEMSEA	COBSEA	SE Asia RPOA	IOSEA MOU	Dugong MOU
Australia	B	B	B	B	N	N	C	C	C	C
Indonesia	B	N	C	B	C	C	C	C	C	
Papua New Guinea		B	B	N	N	N	N	C	C	C
Timor-Leste	B		N	N	N	C	N	C		
% engagement	75	50	67	100	100	100	100	100	75	50

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption

C = agreement to cooperate by signing

N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The arrangements for the issues identified above are summarized in Table 4a-e. An overall summary is presented in Table 5.

[1]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: North Australian Shelf LME /ATSEA[i] – Transboundary arrangement for fisheries – demersal finfish and invertebrates, shrimps/prawns					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	APFIC, SEAFDEC, World Fish Centre	Supra-LME	2	Arafura and Timor Seas Experts Forum (ATSEF)	• Decline and loss of biodiversity and key marine species via targeted fisheries and bycatch is largely addressed under this arrangement. • East Asia RPOA has a regional/sub-regional MCS networks that include the Arafura and Timor Seas • Scores for advice are average of APFIC and SE Asia RPOA • Australian-PNG Torres Strait Treaty covers access in a limited area • Australia-Indonesia MOU Box agreement covers access in a limited area. • Scores are for APFIC, noting that RPOA may be stronger than APFIC, especially for implementation therefore that score in based on the RPOA
Policy decision-making	SE Asia RPOA Coordination Committee APFIC Commission	Supra-LME	1		
Planning analysis and advice	APFIC, SEAFDEC, World Fish Centre	Supra-LME	1		
Planning decision-making	SE Asia RPOA Coordination Committee	Supra-LME	1		
Implementation	CPs RPOA MCS networks	National Supra-LME	1		
Review and evaluation	SE Asia RPOA Coordination Committee	Supra-LME	2		
Data and information	CPs	National	2		
Overall total and % completeness >>			10/21 = 48%		

Table 4b North Australian Shelf LME /ATSEA – Transboundary arrangement for fisheries – Highly Migratory Species (tuna and tuna-like)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	• For HMS three agreements overlap the area. There is significant overlap with the CCSBT area but fisheries for southern bluefin tuna do not appear to be of significance here[2]. The IOTC area also overlaps but the fisheries for the resources covered by this agreement do not appear to be significant in this region. The WCPFC appears to be the agreement most relevant to the resources but does not cover the entire area. • Only 1 country has ratified the WCPF Agreement. • The PIF/SPC/FFA oversee the several treaties and agreements relating to HMS but their overlap with this area is minor (Torres Strait area) • What are the implications of this for HMS fisheries in this LME? • Are there small tunas in the area that these RFMOs should be managing but are not? • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement.
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

[2] CCSBT 2010. Report of the Fifteenth Meeting of the Scientific Committee.

Table 4c: North Australian Shelf LME /ATSEA – Transboundary arrangement for (a) Pollution - LBS and MBS and (b) biodiversity – general..					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	• APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	• Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. • PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: North Australian Shelf LME /ATSEA – Transboundary arrangement for biodiversity - specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: North Australian Shelf LME /ATSEA – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: North Australian Shelf LME /ATSEA governance architecture - System summary[ii]					
IW category: LME		**Countries:** Australia, Indonesia, Papua New Guinea, East Timor	**System name:** North Australian Shelf/ATSEA LME		**Region:** SE Asia
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – demersal finfish and invertebrates, shrimps/prawns	4		48		
Fisheries – HMS (tuna and tuna-like)	4		90		
Pollution -LBS	4		38		
Pollution - MBS	4		38		
Biodiversity - general	4		38		
Biodiversity – specific (sea turtles)	4		52		
Biodiversity – specific (dugong)	4		52		CMS MOU
	System architecture completeness index >>		51%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)					
Policy cycle stage	**Fisheries – demersal finfish and invertebrates, shrimps/prawns**	**Fisheries – HMS**	**Pollution – LBS/MBS and Biodiversity =General**	**Biodiversity - specific (sea turtles)**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	APFIC, SEAFDEC, World Fish Centre	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	SE Asia RPOA Coordination Committee APFIC Commission	WCPFC Commission.	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	APFIC, SEAFDEC, World Fish Centre	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	SE Asia RPOA Coordination Committee	WCPFC Commission.	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	CPs RPOA MCS networks	CPs WCPFC Secretariat FFA	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	SE Asia RPOA Coordination Committee	The Technical and Compliance Committee (TCC)	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	CPs	SPC OFP	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.6
3 and 5	1	1	1	0	0	1	0	0.6
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.6
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0	0	0.14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, the only integration is seen across issues is among the pollution and biodiversity under COBSEA. No body or agency with a mandate to provide policy integration across these issues could be found. The ATSEA project may be fulfilling this role to some extent. But has a limited life-span.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the North Australian Shelf LME/ATSEA Area, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

North Australian Shelf LME / ATSEA Area	Completeness	Integration	Engagement
	51%	0.1	80%

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii]Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the North Brazil Shelf LME

1 The system to be governed

The system is the North Brazil Shelf LME. This includes the marine waters of the countries listed in Table 1 and a small area of High Seas. Although Barbados has a portion of its EEZ in the LME, it is not usually included in this LME as it is not a coastal country.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter XVI-52), so a review is not provided here. This assessment is also informed by the CLME Project TDAs and SAP (Phillips 2011).

Table 1. Percentage of North Brazil Shelf LME area taken up by the EEZ of each country and the High Seas

Country	Percent of LME area
Barbados	2.3
Brazil	49.3
France	11.5
Guyana	12.8
Suriname	12.1
Trinidad and Tobago	4.6
Venezuela	2.4
High Seas	4.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA and Mahon and Phillips (2013):

- Fisheries
- Biodiversity
- Habitat modification
- Pollution

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).
    a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region which was also adopted in 1983 and entered into force on 11 October 1986;
    b. Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region which was adopted on 18 January 1990. The Protocol entered into force on 18 June 2000;

c. Protocol Concerning Pollution from Land-Based Sources and Activities which was adopted on 6 October 1999. The Protocol entered into force on 13 August 2010.

2. Caribbean Regional Fisheries Mechanism (CRFM)
3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
4. Latin American Organization for Fisheries Development (OLDEPESCA)
5. Organization for Central American Fisheries and Aquaculture Sector (OSPECA)
6. Western Central Atlantic Fisheries Commission (WECAFC)
7. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
8. The Strategic Action Programme for The Sustainable Management of The Shared Living Marine Resources of the Caribbean And North Brazil Shelf Large Marine Ecosystems ($CLME^+$ SAP)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the North Brazil Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the North Brazil Shelf LME (area = 1,044,333 km^2)

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
Cartagena Convention and Protocols	7	46	D
CRFM	17	32	D
ICCAT	1	100	B
OLDEPESCA	3	21	D
WECAFC	6	100	B
$CLME^+$ SAP			

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the North Brazil Shelf LME is shown in Table 3

Table 3. Country membership in regional marine agreements relevant to the North Brazil Shelf LME

Coastal countries in the LME	Agreements							
	Cartagena Conven-tion	Carta-gena-LBS	Cartagena SPAW	Cartagena Oil spills	CRFM	ICCAT	OLDE PESCA	WECAFC
Barbados	B		B	B	B	B		C
Brazil	N	N	N	N	N	B		C
France	B	B	B	B	N	B	N	C
Guyana	B	B	B	B	B		B	C
Suriname					B			C
Trinidad and Tobago	B	B	B	B	B	B		C
Venezuela	B		B	B	N	B	B	C
% engagement	83	50	83	83	83	71	33	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-h. These are summarized in Table 5.

Table 4a: North Brazil Shelf LME[i] – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CRFM Secretariat CRFM Forum	Sub-LME	3	WECAFC OLDEPESCA	The CRFM is responsible for fisheries in the waters of CARICOM countries, and for representing these countries with external for fishing interests
Policy decision-making	CRFM Ministerial Council	Sub-LME	1		
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	Sub-LME	2		
Planning decision-making	CRFM Ministerial Council	Sub-LME	1		
Implementation	CRFM Secretariat CPs	Sub-LME National	1		
Review and evaluation	CRFM Secretariat CRFM Forum	Sub-LME	2		
Data and information	CRFM Secretariat	Sub-LME	2		
Overall total and % completeness >>			12/21 = 57%%		

Table 4b: North Brazil Shelf LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WECAFC Scientific Advisory group, and WGs. Commission	Supra-LME	2	CRFM OSPESCA OLDEPESCA OECS	
Policy decision-making	WECAFC Commission	Supra-LME	0		
Planning analysis and advice	Working Groups and Partners	Supra-LME	2		
Planning decision-making	WECAFC Commission	Supra-LME	0		
Implementation	Countries Partner Organizations	National LME	0		
Review and evaluation	Working Groups and Commission	Sub-LME	1		
Data and information	Countries, FAO HQ and Working Groups	National Supra-LME	1		
Overall total and % completeness >>			6/21 = 29%%		

Table 4c: North Brazil Shelf LME – Transboundary arrangements for fisheries - general					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	WECAFC	US is not a member of OLDEPESCA How significant is OLDEPESCA to the members of this LME?
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4d. North Brazil Shelf LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3	The Billfish Foundation (TBF), International Game Fish Association (IGFA) GCFI	Mexico and US are members but not Cuba
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4e. North Brazil Shelf LME – Transboundary arrangement for Pollution – LBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	LBS Scientific and Technical Advisory Committee (STAC)	Supra-LME	3		To what extent is the Cartagena Convention and its protocols significant agreements in the arrangement for Pollution and Biodiversity in the LME?
Policy decision-making	IGM LBS CoP	Supra-LME	1		
Planning analysis and advice	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Supra-LME	2		
Planning decision-making	LBS CoP	Supra-LME	1		
Implementation	Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	LBS STAC	Supra-LME	2		
Data and information	Countries RCUs RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f. North Brazil Shelf LME – Transboundary arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Supra-LME	3	MEXUS -Gulf	The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico.
Policy decision-making	Cartagena Conv. – IGM, Oil Spill CoP	Supra-LME	1		
Planning analysis and advice	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC),RAC/REMPEITC-Carib	Supra-LME	2		
Planning decision-making	Cartagena Conv. - Oil Spill CoP	Supra-LME	1		
Implementation	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Review and evaluation	Cartagena Conv. - Oil Spill STAC	Supra-LME	2		
Data and information	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4g. North Brazil Shelf LME – Transboundary arrangement for Biodiversity – General (PAs, Habitat alteration and depleted non-commercial species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	Supra-LME	3	TNC, CoML	Cuba and U.S. are parties to the SPAW Protocol but not Mexico.
Policy decision-making	SPAW IGM and CoP	Supra-LME	2		
Planning analysis and advice	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	Supra-LME	2		
Planning decision-making	SPAW CoP	Supra-LME	2		
Implementation	SPAW Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	SPAW STAC	Supra-LME	2		
Data and information	SPAW Countries RCUs RACs	Supra-LME	2		
Overall total and % completeness >>			15/21 = 71%		

Table 4h: North Brazil Shelf LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both USA and Mexico are parties to the IAC, but not Cuba
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: North Brazil Shelf LME governance architecture - System summary[ii]					
IW Category: LME		**Countries:** Barbados Brazil, France, Guyana Suriname, Trinidad and Tobago, Venezuela	**System name:** North Brazil Shelf LME		**Region:** Western Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ	7		57		CRFM
Fisheries – EEZ	**7**		29		WECAFC
Fisheries – EEZ	7		43		OLDESPECA
Fisheries - HMS	7		80		
Pollution - LBS	7		62		
Pollution - MBS	7		62		
Biodiversity – General	7		71		
Biodiversity - Specific (sea turtles)	7		57		
	System architecture completeness index >>		58%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 4 a - h) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)								
Policy cycle stage	**Fisheries – EEZ (CRFM)**	**Fisheries – EEZ (WECAFC)**	**Fisheries – EEZ (OLDEPESCA)**	**Fisheries - HMS**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity – General**	**Biodiversity - Specific (sea turtles)**
Policy analysis and advice	CRFM Secretariat CRFM Forum	WECAFC SAG, and WGs. Commission	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS	LBS STAC	Cartagena - OSP STAC, OSP COP	Cartagena SPAW Protocol STAC SPAW COP	IAC Consultative and Scientific Committees
Policy decision-making	CRFM Ministerial Council	WECAFC Commission	OLDEPESCA - Council of Ministers	ICCAT Commission	IGM LBS CoP	Cartagena – IGM, OSP CoP	SPAW IGM and CoP	IAC Consultative Committee and CoP
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	Working Groups and Partners	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS and Species Panels	LBS STAC CIMAB-RAC-Cuba IMA-RAC-Trinidad	Cartagena Conv. – OSP STAC,RAC/REMP EITC-Carib	SPAW STAC RAC-SPAW Guadeloupe	IAC Consultative and Scientific Committees
Planning decision-making	CRFM Ministerial Council	WECAFC Commission	Countries	ICCAT Commission	LBS CoP	Cartagena Conv. - Oil Spill CoP	SPAW CoP	IAC CoP
Implementation	CRFM Secretariat CPs	Countries Partner Organizations	Countries	Countries	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs,RACs	SPAW Countries RCUs RACs	IAC Countries
Review and evaluation	CRFM Secretariat CRFM Forum	Working Groups and Commission	OLDEPESCA - Council of Ministers	CMMCC)	LBS STAC	Cartagena Conv. - Oil Spill STAC	SPAW STAC	IAC Countries
Data and information	CRFM Secretariat	Countries, FAO HQ and Working Groups	Countries OLDEPESCA – Secretariat	PWG	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs, RACs	SPAW Countries RCUs RACs	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	1	1	1	0	0	0	0	0.4
1 and 3	0	0	0	0	0	0	0	-
1 and 4	0	0	0	0	0	0	0	-
1 and 5	0	0	0	0	0	0	0	-
1 and 6	0	0	0	0	0	0	0	-
1 and 7	0	0	0	0	0	0	0	-
1 and 8	0	0	0	0	0	0	0	-
2 and 3	0	0	0	0	0	0	0	-
2 and 4	0	0	0	0	0	0	0	-
2 and 5	0	0	0	0	0	0	0	-
2 and 6	0	0	0	0	0	0	0	-
2 and 7	0	0	0	0	0	0	0	-
2 and 8	0	0	0	0	0	0	0	-
3 and 4	0	0	0	0	0	0	0	-
3 and 5	0	0	0	0	0	0	0	-
3 and 6	0	0	0	0	0	0	0	-
3 and 7	0	0	0	0	0	0	0	-
3 and 8	0	0	0	0	0	0	0	-
5 and 6	0	0	0	0	0	0	0	-
5 and 7	0	0	0	0	0	0	0	-
5 and 8	0	0	0	0	0	0	0	-
5 and 9	1	1	1	1	1	1	1	1.0
6 and 7	1	1	1	1	1	1	1	1.0
6 and 8	1	1	1	1	1	1	1	1.0
6 and 9	0	0	0	0	0	0	0	-
7 and 8	1	1	1	1	1	1	1	1.0
7 and 9	0	0	0	0	0	0	0	-
8 and 9	0	0	0	0	0	0	0	-
Average	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1.

3 Conclusions

The two arrangements for fisheries (CRFM and WECAFC) in the areas within national jurisdiction are closely connected. So are the two arrangements for pollution and biodiversity that fall under the Cartagena Convention. However neither of these pairs appears to be integrated with each other or with the tuna arrangement (ICCAT)

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the North Brazil Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

North Brazil Shelf LME	Completeness	Integration	Engagement
	58%	0.2	74%

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the North Sea LME

1 The system to be governed

The system is the North Sea LME. It is situated on the continental shelf of northwestern Europe. It covers an area of about 690,000km^2. The countries bordering this LME includes Belgium, Denmark, Denmark (Faroe Islands), France, Germany, Netherlands, Norway, Sweden and the United Kingdom (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 42), so a review is not provided here.

Table 1. Percentage of North Sea LME area taken up by the EEZ of each country and the High Seas (area = 689,073 km^2)

Country (N to S)	Percent of LME area
Belgium	0.5
Denmark (Greenland)	11.6
Denmark (Faroe Islands)	1.5
France	0.3
Germany	5.9
Netherlands	8.9
Norway	22.7
Sweden	2.0
United Kingdom	46.5
High Seas	0.2

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 42 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - increasing commercially overexploited stocks;
  - invasive species from ballast water and shipping
- Pollution
  - (LBS) Eutrophication (sewage effluents, leaching from agricultural land, contributions from rural populations and atmospheric nitrogen deposition)
- Pollution
  - (MBS) Hazardous substances, oily wastes and slicks

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)

4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. North-East Atlantic Fisheries Commission (NEAFC)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
8. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
9. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
10. European Union Common Fisheries Policy (CFP)
11. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the North Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the North Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	1	18	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	3	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	3	100	C
North-East Atlantic Fisheries Commission (NEAFC)	5	99	D
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	5	100	C
Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)	50	94	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	32	97	C
European Union Common Fisheries Policy (CFP)	14	76	D
European Union Maritime Policy	14	76	D

The extent of country membership in these bodies and instruments for the North Sea LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the North Sea LME									
Coastal countries in the LME	Agreements								
	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	Bonn	ASCOBANS	CFP
Belgium	N	B				B	B	B	B
Denmark (Greenland)			B	B	B	B			
Denmark (Faroe Islands)			B	B	B	B			
France	B	B				B	B	B	B
Germany	N	B				B	B	B	B
Netherlands		B				B	B	B	B
Norway	B	B	B	B	B	B	B	C	
Sweden	N	B		B		B	B	B	B
United Kingdom	B	B				B	B	B	B
% engagement	50	78	33	44	33	100	78	78	67
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4a- 4i. They are summarised in table 5.

Table 4a: North Sea LME[i] – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: North Sea LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: North Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. North Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: North Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: North Sea LME – Transboundary Arrangement General – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
		Overall total and % completeness >>	14/21 = 67%		

Table 4g: North Sea LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4h: North Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4i: North Sea LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2		
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: North Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries:** Belgium, Denmark, Denmark (Faeroe Islands), France, Germany, Netherlands, Norway, Sweden and the United Kingdom		**System name: North Sea**		**Region:** North East Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	8		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	8		86%		ICCAT
Fisheries – specific (salmon)	8		57%		NASCO
Fisheries - Marine Mammals	8		71%		NAMMCO
Fisheries - EEZ	8		90%		CFP
Pollution - LBS	8		90%		OSPAR
Pollution - MBS	8		90%		OSPAR
Pollution - LBS	8		67%		Arctic Council
Pollution - MBS	8		67%		Arctic Council
Pollution - MBS	8		38%		Bonn
Biodiversity – Small Cetaceans	8		62%		ASCOBANS
	System architecture completeness index >>		73%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-i) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)											
Policy cycle stage	**Fisheries - Salmon**	**Fisheries – marine mammals**	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution – MBS**	**Pollution – LBS**	**Pollution – MBS**	**Pollution - MBS**	**Biodiversity - Specific**
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - PEMAS ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Bonn Agreement – Contracting Parties	ASCOBANS Advisory Committee
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Meeting of the Parties	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Contracting Parties	ASCOBANS Advisory Committee
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Meeting of the Parties	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO	Countries	Countries	Contracting Parties Scientific, Technical	Countries OSPAR Commission Special	Countries OSPAR Commission Special	Countries	Countries	Contracting Parties	Contracting Parties

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)											
Policy cycle stage	**Fisheries - Salmon**	**Fisheries – marine mammals**	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution – MBS**	**Pollution – LBS**	**Pollution – MBS**	**Pollution - MBS**	**Biodiversity - Specific**
		Control Scheme for Hunting			and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Studies OSPAR Secretariat	Studies OSPAR Secretariat				
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	Commission on STECF	OSPAR Commission Main Committees and Working Groups	OSPAR Commission Main Committees and Working Groups	Arctic Council	Arctic Council	Meeting of the Parties	Meeting of the Parties
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Contracting Parties Commission STECF Advisory Councils	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat	Contracting Parties	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0

6 and 11	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
8 and 9	1	1	1	1	1	1	1	1
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
9 and 10	0	0	0	0	0	0	0	0
9 and 11	0	0	0	0	0	0	0	0
10 and 11	0	0	0	0	0	0	0	0
Average	0.4	0.04	0.04	0.04	0.04	0.04	0.04	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.04 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the North Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

North Sea LME	Completeness	Integration	Engagement
	73%	0.1	62%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009.The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
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3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Northeast US Continental Shelf LME

1 The system to be governed

The system is the Northeast U.S. Continental Shelf LME. This LME has an area of 310,000 km^2 and extends from the Gulf of Maine to Cape Hatteras in the Atlantic Ocean. It spans four major sub-areas: Gulf of Maine, Georges Bank, Southern New England, and the Mid-Atlantic Bight along the marine waters of the countries as indicated in Table 1.

Table 1. Percentage of Northeast U.S. Continental Shelf LME area taken up by the EEZ of each country and the High Seas (area = 310,000 km^2)

Country	Percent of LME area
Canada	16.9
United States	82.1
High Seas	1.1

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 61), so a review is not provided here.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 61 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - decline in biomass of fish stocks; excessive fishing mortality; collapse of commercially exploited stocks; overfishing of several demersal stocks
- Biodiversity
  - benthic community degradation
- Pollution
  - (LB) fish tissue contamination and increasing eutrophication
  - (LBS) high levels of sediment contamination (near urban centres)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

Governance in this LME is shared among several stewardship agencies and there is a complex layering of management agencies. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)

2. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Northeast U.S. Continental Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Northeast U.S. Continental Shelf LME (area = 315,654 km^2)

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	2	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	90	D

The extent of country membership in these bodies and instruments for the Northeast U.S. Continental Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Northeast U.S. Continental Shelf LME

Coastal countries in the LME	Agreements			
	ICCAT	NAFO	NAMMCO	NASCO
Canada	B	B		B
United States	B	B		B
% engagement	100	100		100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in Table 5

Table 4a. Northeast U.S. Continental Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4b: Northeast U.S. Continental Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Northeast U.S. Continental Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Neither country is eligible to be full members without the expressed agreement of the 4 original signatory countries
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Northeast U.S. Continental Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Northeast U.S. Continental Shelf LME governance architecture - System summary[i]					
IW category: LME	**Countries:** Canada, USA		**System name:** Northeast U.S. Continental Shelf LME		**Region:** NW Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	2		86%		
Fisheries – large pelagics (tunas and tuna-like)	2		81%		
Fisheries - specific (marine mammals	2		71%		
Fisheries – specific (salmon)	2		57%		
Pollution – MBS	2		0%		
Pollution - LBS	2		0%		
	System architecture completeness index >>		49%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Issues relating to invasive species and marine pollution are not addressed specifically as transboundary issues between the countries in the LME. This is likely due to the LME being primarily within Canada's maritime domain and as such, dealt with nationally and at levels higher than the LME such as the case for ballast water discharges from international shipping.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[ii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - Specific**	**Fisheries - Specific - Marine Mammals**
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee
Planning decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMMCO Council Committee on Inspection and Observation
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

None of the four fisheries agreements (NAFO, ICCAT, NASCO and NAMMCO) have formal linkages identified across the different stages of the policy cycle.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Northeast U.S. Continental Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Northeast U.S. Continental Shelf LME	Completeness	Integration	Engagement
	49%	0	75%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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0 = No decision-making mechanism[v]
1 = Decisions are recommendations to countries
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Implementation:
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2 = Countries and regional/global level support[vi]
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End notes

[i] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[ii] The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iii] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

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[v] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vi] This means support from regional programmes or partner organizations arranged via secretariat

[vii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[viii] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[ix] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Northern Bering - Chukchi Seas LME

1 The system to be governed

The system is the Northern Bering - Chukchi Seas LME. It is located off Russia's East Siberian coast and the northwestern coast of Alaska (Table 1). It is fed by both Pacific and Arctic waters. Pacific waters enter the LME via the Bering Strait.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter XI-31), so a review is not provided here.

Table 1. Percentage of Northern Bering - Chukchi Seas LME area taken up by the EEZ of each country and the High Seas (area = 1,323,717 km^2)

Country	Percent of LME area
Russia	42.9
United States	35.2
High Seas	21.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) as follows:

- Fisheries
  - dramatic oscillations on the scale of two-to-three years (due to the impact of varying ice and weather regimes; or the internal dynamics of this ecosystem)
- Pollution (LBS)
  - increasing distribution of organic pollutants; high HCHs content (exceeding PCBs and DDTs); a broad spectrum of trace metals including heavy metals, aromatic and chlorinated hydrocarbons
  - MBS are generally slight and attributed mainly to chemicals and oil spills
- Biodiversity/Habitat Modification
  - localised degradation of some habitats (mainly attributable to pollution)
- Climate Change
  - warming rapidly; thinning polar ice pack; profound ecological impact expected

2.2 Identify arrangements for each transboundary issue

The Northern Bering - Chukchi Seas LME is bordered by Russia and the U.S. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

2. International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery(IPHC)
3. The North Pacific Marine Science Organization (PICES)
4. Agreement on the Conservation of Polar Bears (ACPB)
    a. Agreement between the Government of the United States of America and the Government of the Russian Federation on the conservation and management of the Alaska-Chukotka polar bear population

The extent to which the geographical area of coverage of these bodies and instruments overlap the Northern Bering - Chukchi Seas LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with Northern Bering - Chukchi Seas LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Arctic Council (AC)	7.2	100	C
International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery(IPHC)	3	17	D
The North Pacific Marine Science Organization (PICES)	1	27	D

The extent of country membership in these bodies and instruments for the Northern Bering - Chukchi Seas LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Northern Bering - Chukchi Seas LME

LME coastal countries	Agreement				
	AC	IPHC	PICES	ACPB	ACPB Alaska-Chukotka
Russia	C	N	B	B	B
United States	C	B	B	B	B
% engagement	100	100	100	100	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-c. They are summarised in table 5

Table 4a: Northern Bering - Chukchi Seas LME[i] – Transboundary Arrangements for Fisheries – Halibut					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3	PICES?	Russia is not a member
Policy decision-making	IPHC - Commission	LME	3		
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3		
Planning decision-making	IPHC - Commission	LME	3		
Implementation	Countries	National	2		
Review and evaluation	IPHC – Conference Board	LME	3		
Data and information	IPHC – Conference Board	LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4b: Northern Bering - Chukchi Seas LME – Transboundary Arrangement for Pollution – LBS and MBS, Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC) IMO	Both countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4c: Northern Bering - Chukchi Seas LME – Transboundary Arrangement for Biodiversity - Protection of Polar Bears					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia National Sections, Scientific Working Groups	Supra-LME National Sub-LME	2	Arctic Council	Both coastal states are members of ACPB although Russia has only signed, not ratified Both countries have signed the agreement under ACPB regarding the Alaska-Chukotka polar bears The arrangement includes both the ACPB and the subsequent US-Russia Polar Bear Agreement so the scores are the average of the two agreements (ACPB 8/21; US-Rus 12/21)
Policy decision-making	US-Russia Polar Bear Commission ACPB- Countries	Sub-LME Supra-LME National	1		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	Supra-LME National	1		
Implementation	ACPB Countries US –Russia agreement countries	National	0.5		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group US-Russia Polar Bear Commission	Supra-LME Sub-LME	1.5		
Data and information	ACPB Countries ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia agreement countries	National Supra-LME Sub-LME	2		
Overall total and % completeness >>			10/21 = 48%		

Table 5: Northern Bering - Chukchi Seas LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Russia, United States**		**System name: Chukchi Sea**		**Region: North Polar**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - Halibut	2		95%		
Pollution (LBS)	2		67%		
Pollution (MBS)	2		67%		
Biodiversity - General	2		67%		
Biodiversity - Protection of Polar Bears	2		48%		
	System architecture completeness index >>		69%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-c)					
Policy cycle stage	**Fisheries - Halibut**	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Polar Bear**
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia National Sections, Scientific Working Groups
Policy decision-making	IPHC - Commission	Arctic Council			US-Russia Polar Bear Commission ACPB- Countries
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts
Planning decision-making	IPHC - Commission	Arctic Council	Arctic Council	Arctic Council	ACPB Countries
Implementation	Countries	Countries	Countries	Countries	ACPB Countries US –Russia agreement countries
Review and evaluation	IPHC – Conference Board	Arctic Council	Arctic Council	Arctic Council	ACPB - IUCN Polar Bear Specialist Group US-Russia Polar Bear Commission
Data and information	IPHC – Conference Board	Countries Secretariat	Countries Secretariat	Countries Secretariat	ACPB Countries ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia agreement countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	0	1	0	1	0	1	1	0.57
2 and 4	0	1	0	1	0	1	1	0.57
2 and 5	0	0	0	0	0	0	0	0
3 and 4	0	1	0	1	0	1	1	0.17
3 and 5	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
Average	0	0.3	0	0.3	0	0.3	0.3	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the five issues is 0.2 out of a possible 1.

3 Conclusions

While the halibut (IPHC) and polar bear (ACPB) arrangements do not appear to be connected, the arrangement for land-based and marine-based pollution, biodiversity in general and fisheries under the Arctic Council is well-integrated. However, since the Arctic Council is not constituted under a Convention, it is limited in terms of its ability to create any binding agreements and is dependent on countries to implement its recommendations. The Council is currently working with the IMO to develop a polar code for marine activities in the Arctic and Antarctic. This LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Northern Bering – Chukchi Seas LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Northern Bering – Chukchi Seas LME	Completeness	Integration	Engagement
	69%	1.0	100%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared

or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Norwegian Sea LME

1 The system to be governed

The system is the Norwegian Sea LME. It is a western boundary ecosystem situated off the West Coast of Norway and consists of two deep basins and the Norwegian shelf along the eastern rim. It covers about 1.12 million km^2 along the coasts of Denmark Iceland, Norway, Norway (Jan Mayen) and the United Kingdom (Table 1)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter 43), so a review is not provided here.

Table 1. Percentage of Norwegian Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,120,000 km^2)

Country	Percent of LME area
Denmark	9.6
Iceland	5.3
Norway	12.8
Norway (Jan Mayen)	49.6
United Kingdom	2.1
High Seas	20.6

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 43 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - increasing number of collapsed stocks and commercially exploited stocks
- Pollution
  - (MBS) offshore oil industry (spills); substandard ships

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

More than 20 treaties and agreements cover the entire Arctic area. However, the key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. North-East Atlantic Fisheries Commission (NEAFC)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Norwegian Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with Norwegian Sea LME (area = 1,070,359 km^2)

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
Arctic Council (AC)	4	65	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	7	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	5	100	C
North-East Atlantic Fisheries Commission (NEAFC)	8	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	8	100	C

The extent of country membership in these bodies and instruments for the Norwegian Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Norwegian Sea LME

Coastal countries in the LME	Agreements						
	AC	ICCAT	ICES	NASCO	NAMMCO	NEAFC	OSPAR
Denmark	C		B			B	B
Iceland	C	B	B	B	B	B	B
Norway	C	B	B	B	B	B	B
Norway (Jan Mayen)	C	B	B	B	B	B	B
United Kingdom	N	B	B				B
% engagement	100	80	100	60	67	80	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5.

Table 4a: Norwegian Sea LME[i] – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Norwegian Sea LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Norwegian Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Norwegian Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4e: Norwegian Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Norwegian Sea LME – Transboundary Arrangement General – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
		Overall total and % completeness >>	14/21 = 67%		

Table 5: Norwegian Sea LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries:** Denmark Iceland, Norway, Norway, United Kingdom	**System name:** Norwegian Sea		**Region:** North East Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		81%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution - LBS	3		67%		Arctic Council
Pollution - MBS	3		67%		Arctic Council
	System architecture completeness index >>		76%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage for the Norwegian Sea LME (from table5)								
Policy cycle stage	**Fisheries - Salmon**	**Fisheries – marine mammals**	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Pollution – LBS**	**Pollution – MBS**	**Pollution – LBS**	**Pollution – MBS**
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Arctic Council	Arctic Council
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements for the Norwegian Sea LME. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	1	1	1	1	1	1	1	1
Average	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.1 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Since the LME is largely a single country one and Denmark has a focus on EBM, the integration may be taking place at the national level.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Norwegian Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Norwegian Sea LME	Completeness	Integration	Engagement
	76%	0.1	83%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
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Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Oyashio Current LME

1 The system to be governed

The system is the Oyashio Current LME. This includes marine waters of Japan and Russia, including a large disputed area (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel2009, Chapter X 24), so a review is not provided here. This assessment is also informed by the Northwest Pacific Action Plan (UNEP 1994), the NOWPAP website and the GIWA assessment for the Oyashio Current (Alekseev, et al. 2006)

Table 1. Percentage of Oyashio Current LME area taken up by the EEZ of each country and the High Seas (area = 532,818 km^2)

Country	Percent of LME area
Disputed (Southern Kurile Islands)	25.6
Japan	12.4
Russia	60.1
High Seas	2.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The main fishery resources identified as transboundary are tunas and billfishes. Whereas, the area covered by the West Central Pacific Fisheries Commission, which has the mandate for management of these species in the western Pacific, does cover the Oyashio Current LME (Table 2), the fisheries that it manages cannot be said to be a significant issue in this LME. Therefore the relevance of the WCPFC to the LME is minor. However, it can be said that an arrangement for highly migratory species is in place for the tuna and billfish stocks in this LME.

Whereas, FAO (1994) indicates that there are probably several substantial straddling stocks in this region, it does not give details specific to the Oyashio Current and Sherman and Hempel (2009) do not make specific reference to shared or straddling stocks. However, it is assumed here that there are transboundary fishery resources that would require a transboundary arrangement.

Given that the Kuril Islands are disputed, it is not clear whether biodiversity in this area should be considered a transboundary issue. If most biodiversity threats are coastal in nature, or due to habitat damage from fishing within EEZs then the issue cannot be considered to be transboundary. Pollution issues affecting marine waters are all considered to be transboundary.

The transboundary issues to be addressed by governance were identified as:

- Fisheries
    - Small pelagics and demersal finfish and invertebrates
- Pollution
    - LBS

- MBS oils spills

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The North Pacific Marine Science Organization (PICES)
2. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
3. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)[1]
4. Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)
5. UNEP Northwest Pacific Action Plan 1994– NOWPAP
    a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
    b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
    c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
    d. Data and Information Network RAC- DINRAC, Beijing, China

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Oyashio Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Oyashio Current LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[2]
NPAFC	<1	2	D
PICES	2	100	C
WCPFC	1	100	C

[1] Merger of former Marine Resource Conservation and Fisheries Working Groups

[2] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Oyashio Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Oyashio Current LME

Coastal countries in the LME	Agreements			
	NPAFC	PICES	WCPFC	APEC OFWG
Japan	B	B	B	C
Russia	B	B		C
% engagement	100	100	50	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-b. They are summarised in table 5

Table 4a: Oyashio Current LME[1] – Transboundary arrangement for fisheries – Shared small pelagics and demersal finfish and invertebrates					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	PICES, APEC-OFWG	Supra-LME	1	PICES, APEC-OFWG?	• There is no structured transboundary arrangement for fisheries other than tuna under the WCPFC, and tuna fisheries are not prominent in the Oyashio Current LME. • There is some collaboration in fisheries science and assessment through PICES and countries may engage in some level of policy discussion through the APEC-OFWG.
Policy decision-making	Countries	National	0		
Planning analysis and advice	PICES, APEC-OFWG	Supra-LME	1		
Planning decision-making	Countries	National	0		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	0		
Data and information	PICES	Supra-LME	1		
Overall total and % completeness >>			3/21 = 14%		

Table 4b: Oyashio Current LME – Transboundary arrangement for pollution – LBS and oil spills					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Oyashio Current LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** Japan, Russia		**System name:** Oyashio Current LME		**Region:** North Pacific
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – Shared small pelagics and demersal finfish and invertebrates	2		14		ICES only
Pollution – LBS and oil spills	2		38		NOWPAP
Pollution – LBS and oil spills	2		38		
	System architecture completeness index >>		30		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-b) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)		
Policy cycle stage	**Fisheries -** Shared small pelagics and demersal finfish and invertebrates	**Pollution – LBS and oil spills**
Policy analysis and advice	None	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	None	NOWPAP-IGM
Planning analysis and advice	PICES, APEC-OFWG	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	None	NOWPAP-IGM
Implementation	None	Countries
Review and evaluation	None	CEARAC, MERRAC
Data and information	PICES	DINRAC, MERRAC, CEARAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	1	1	1	1
Average	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the two issues is 0.3 out of a possible 1.

The appearance of high integration among arrangements 2, 3, 4 and 5 arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

3 Conclusions

In this LME, there is essentially no transboundary fisheries arrangement. However, PICES does provide opportunity for transboundary cooperation in assessment and science. Also, the fact that there is no regional seas convention covering the area, but only an action plan, seriously weakens capacity for transboundary governance in areas relating to pollution. Further, there is no indication of transboundary integration between the fisheries and pollution issues, other than through cooperation in science. There is the potential for integration of pollution and biodiversity issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any other organisation than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
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High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Oyashio Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Oyashio Current LME	Completeness	Integration	Engagement
	100%	0.3	30%

4 References

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Yatsu, A. 2008. Fisheries management and regime shifts: lessons learned from the Kuroshio/Oyashio Current System

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End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

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[ii]Table notes:

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Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Pacific Central American Coastal LME

1 The system to be governed

The system is the Pacific Central American Coastal (PCAC) LME. This includes the marine waters of the Pacific Ocean extending from 22°N to 4°S under the jurisdiction of Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Peru, Colombia and Ecuador. The LME covers a surface area of nearly 2 million km^2 and is shared among the member countries as indicated in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 48), so a review is not provided here. This assessment is also informed by the Eastern Equatorial Pacific GIWA Regional Assessment (UNEP, 2006), the Northeast Pacific Regional Seas Profile (UNEP, n.d.) and the Asia Pacific Economic Cooperation Workshop IV on Large Marine Ecosystems (2013). While efforts have been made to seek support from GEF for an International Waters LME project, no funding for the LME-scaled project has been received to date (APEC, 2013).

Table 1. Percentage of Pacific Central American Coastal LME area taken up by the EEZ of each country and the High Seas (area = 1,974,291 km^2)

Country	Percent of LME area
Colombia	14.2
Costa Rica	9.8
Ecuador	7.0
El Salvador	4.4
Guatemala	5.3
Honduras	0.0
Mexico	45.1
Nicaragua	3.1
Panama	9.4
Peru	0.5
High Seas	1.1

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the preliminary TDA (2006):

- Fisheries
  - over-exploitation of wild shrimp species
  - declining small coastal pelagic
  - maintaining the largest tuna catches in the eastern Pacific
- Pollution
  - LBS (nutrients, sediments and pesticides)
  - MBS (oil and ballast water)
- Biodiversity
  - by-catch of demersal species from wild shrimp harvesting
  - decline of marine turtles and sharks

- habitat modification leading to disappearance and destruction of mangroves and wetlands

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of elasmobranchs or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement. Indeed, in many countries protection of these species is under fisheries legislation.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Antigua Convention – Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific – not yet in force as only Panama has ratified the Convention.
2. Permanent Commission for the South Pacific (CPPS)
3. The Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific (Lima Convention, 1986) - The South-East Pacific Regional Seas Programme
    a. Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific
    b. 3 Pollution Protocols – Hydrocarbon spills (1987), LBS (1986), radioactive (1995)
    c. Biodiversity Protocol – Management of marine and coastal protected areas (1994)
4. MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances and its Action Plan (MEXUS-PAC)
5. International Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)
6. Organization for Central American Fisheries and Aquaculture Sector (OSPESCA)
7. Latin American Organization for Fisheries Development (OLDEPESCA)
8. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Pacific Central American Coastal LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Pacific Central American Coastal LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua)	44	61	D
Permanent Commission for the South Pacific (CPPS)	6	30	D
Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific - The Lima Convention (Lima)	11	38	D
Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)	3	100	C
Latin American Organization for Fisheries Development (OLDEPESCA)	21	72	D
Organization for Central American Fisheries and Aquaculture Sector (OSPESCA)	35	38	D
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the Pacific Central American Coastal LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Pacific Central American Coast LME											
LME coastal countries	Agreements										
	Antigua	IATTC	OLDEPESCA	OSPECA	CPPS	IAC	Lima Convention	Lima LBS	Lima Hydrocarbon	Lima Radioactive	Lima CMPAs
Mexico		B	B	N	N	B	N	N	N	N	N
Guatemala	C	B		B	N	B	N	N	N	N	N
El Salvador	C	B	B	B	N		N	N	N	N	N
Honduras	C	N	B	B	N	B	N	N	N	N	N
Nicaragua	C	B	B	B	N	C	N	N	N	N	N
Costa Rica	C	B	B	B	N	B	N	N	N	N	N
Panama	B	B		B	N	B	B	B	B	B	B
Peru	N	B	B	N	B	B	B	B	B	B	B
Colombia		B		N	B		B	B	B	B	B

[1]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Pacific Central American Coast LME											
LME coastal countries	Agreements										
	Antigua	IATTC	OLDEPESCA	OSPECA	CPPS	IAC	Lima Convention	Lima LBS	Lima Hydrocarbon	Lima Radioactive	Lima CMPAs
Ecuador	N	B	B	N	B	B	B	B	B	B	B
% engagement	0	100	70	100	100	70	100	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed											

2.2.1 Assessment of transboundary issue

The governance arrangements for the issues identified above are presented in Tables 4 a-g. They are summarised in table 5

Table 4a: Pacific Central American Coastal LME[i] – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	Supra-LME	3	OLDEPESCA OSPESCA	CPPS only covers the 3 countries in the LME from South America and as such, does not include the 70% majority of the countries in this LME. How do the countries in the LME reconcile overlaps with CPPS and OLDEPESCA and with OLDEPESCA and OSPESCA as they technically address the same fisheries but cover different parts of the LME? For countries who are members of more than one agreement, what is the current relationship between their interactions with each organization?
Policy decision-making	CPPS – Assembly	Supra-LME	2		
Planning analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	Supra-LME	3		
Planning decision-making	CPPS – Executive Committee	Supra-LME	2		
Implementation	CPPS Member Countries	National	2		
Review and evaluation	CPPS – Executive Committee	LME	2		
Data and information	CPPS Member Countries CPPS Secretariats	National Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4b: Pacific Central American Coastal LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	CPPS OSPECA	OLDEPESCA members includes 6 of the 10 countries in the LME but score much weaker than CPPS in terms of completeness How do the countries in the LME reconcile overlaps with CPPS and OLDEPESCA and with OLDEPESCA and OSPESCA as they technically form one arrangement but cover different parts of the LME? For countries who are members of more than one agreement, what is the relationship between their interactions with each organization?
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4c: Pacific Central American Coastal LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3	OLDEPESCA CPPS	OSPESCA members includes 6 of the 10 countries in the LME that are part of the Central American isthmus and as such, does not include Mexico nor the three South American countries of Colombia, Peru and Ecuador. Furthermore, none of the Central American countries are members of CPPS due to its area of competence How do the countries in the LME reconcile overlaps this apparent division of the LME by arrangements when they technically address the same fisheries but cover different parts of the LME? For countries who are members of more than one agreement, what is the current relationship between their interactions with each organization?
Policy decision-making	OSPESCA - Council of Ministers	Supra-LME	2		
Planning analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3		
Planning decision-making	OSPESCA Member countries	Supra-LME National	2		
Implementation	OSPESCA Member Countries	National	2		
Review and evaluation	OSPESCA - Council of Ministers	LME	2		
Data and information	OSPESCA Member Countries OSPESCA Secretariat	National Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4d: Pacific Central American Coastal LME – Transboundary arrangements for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IATTC - Scientific Advisory Committee	LME	3		All countries are members of IATTC which bodes well given the importance of the large pelagic fishery to the region.
Policy decision-making	IATTC - Commission	LME	3		
Planning analysis and advice	IATTC - Scientific Advisory Committee	LME	3		
Planning decision-making	IATTC - Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	Committee for the Review of Implementation of Measures Adopted by the Commission	LME	3		
Data and information	Secretariat Countries	LME National	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e. Pacific Central American Coastal LME – Transboundary Arrangements for Pollution – LBS (Lima LBS Protocol) and MBS (Lima Oil Spill and Radioactive Protocols)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project) MEXUS-PAC	Ecuador, Colombia and Panama are members of all of the Lima Convention Protocols. Curiously Panama is not a party to the Convention but is a member of its Action Plan and all of its protocol. MEXUS PAC only relates to the US and Mexico in the case of oil spill emergencies.
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f: Pacific Central American Coastal LME – Transboundary Arrangements for Biodiversity - CMPAs and habitat deterioration (Lima Protocol on Management of coastal and marine protected areas)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project)	Ecuador, Colombia and Panama are members of this agreement in this LME.
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4g: Pacific Central American Coastal LME – Transboundary Arrangements for Biodiversity - Turtles					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Pacific Central American Coastal LME governance architecture - System summary[ii]					
IW category: LME	**Countries: Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Peru, Colombia and Ecuador**		**System name: PCAC**		**Region: Eastern Central Pacific**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - species within EEZ	10		76%		
Fisheries - species within EEZ	10		43%		
Fisheries - species within EEZ	10		76%		
Fisheries – HMS (tunas and tuna-like species)	10		86%		
Pollution – LBS	10		62%		
Pollution - MBS	10		62%		
Pollution - MBS	10		62%		
Biodiversity - CMPAs and habitat deterioration	10		62%		
Biodiversity – Specific (Turtles)	10		57%		
	System architecture completeness index >>		65%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-g)									
Policy cycle stage	**Fisheries – EEZ**	**Fisheries – EEZ**	**Fisheries – EEZ**	**Fisheries - HMS**	**Pollution – LBS**	**Pollution - MBS**	**Pollution - MBS**	**Biodiversity – PA and Hab Mod**	**Biodiversity - turtles**
Policy analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	OLDEPESCA - Board and Technical Committee Expert Groups	OSPESCA – Directors of Fisheries and Aquaculture Commission	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Policy decision-making	CPPS – Assembly	OLDEPESCA - Council of Ministers	OSPESCA - Council of Ministers	IATTC - Commission	High Contracting Parties	High Contracting Parties	High Contracting Parties	High Contracting Parties	IAC Consultative Committee and CoP
Planning analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	OLDEPESCA - Board and Technical Committee Expert Groups	OSPESCA – Directors of Fisheries and Aquaculture Commission	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Planning decision-making	CPPS – Executive Committee	Countries	OSPESCA Member countries	IATTC - Commission	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	IAC CoP
Implementation	CPPS Member Countries	Countries	OSPESCA Member Countries	Countries	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	IAC Countries
Review and evaluation	CPPS – Executive Committee	OLDEPESCA - Council of Ministers	OSPESCA - Council of Ministers	Committee for the Review of Implementation of Measures Adopted by the Commission	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	IAC Countries
Data and information	CPPS Member Countries CPPS Secretariats	Countries OLDEPESCA – Secretariat	OSPESCA Countries OSPESCA Secretariat	Secretariat Countries	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	1	0	1	1	1	1	0.71
5 and 8	0	1	0	1	1	1	1	0.71
5 and 9	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.71
6 and 8	0	1	0	1	1	1	1	0.71
6 and 9	0	0	0	0	0	0	0	0
7 and 8	0	1	0	1	1	1	1	0.71
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0	0.17	0	0.17	0.17	0.17	0.17	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this LME, integration across the arrangements for the nine issues is 0.1 out of a possible 1.

3 Conclusions

There are three separate arrangements for fish species within the EEZ (CPPS, OLDESPECA and OSPESCA) as well as the arrangement for tuna and tuna-like species (IATTC). However, somewhat unique among LMEs, is the Secretariat for the Regional Seas Convention being housed at the Permanent Commission for the South Pacific (CPPS). While specific formal integration is mentioned in the two Conventions, it is likely that the two Commissions have considerable informal linkages since the secretariats for both CPPS and the Lima Convention are within the same organization. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. Governance arrangements for this LME appear to be split along geographic lines with arrangements for the southern part of the LME being distinct from those for the northern part. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Pacific Central American Coastal LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Pacific Central American Coastal LME	Completeness	Integration	Engagement
	65%	0.1	85%

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Western Pacific Warm Pool

1 The system to be governed

The system is the Western Pacific Warm Pool (WPWP). This includes the marine waters of the countries listed in Table 1 as well as a significant area of high seas. The WPWP is generally defined as defined as the area of ocean in the Western Tropical Pacific within the isotherm of annual-average sea surface temperature of 28°C. As such, the boundaries of the WPWP are dynamic, changing seasonally and from year to year. For the purposes of TWAP the WPWP is defined as the WARM ocean province of Longhurst (1998) (Honey and Sherman 2013). Whereas, Honey and Sherman (2013) argue that the WPWP is not in LME, GEF documents refer to it as one.

The assessment also looks at the area comprising the Pacific Ocean EEZs of Pacific Island Forum members. This may be a more appropriate representation of the Pacific Islands Region.

This assessment is informed by the project documents (TDA, PRODOC, SAP, etc.) of the two phases (2005-2011 and 2011-2015) of the GEF Pacific Islands Oceanic Fisheries Management Project (OFMP) (UNDP 2004). It is also informed by the Framework of the Pacific Oceanscape (FPO) (Pratt and Govan, 2011, Govan 2013) and by reports of the Secretariat of the Pacific Community (SPC 2012, 2013).

Table 1. Percentage of WPWP area taken up by the EEZ of each country and the High Seas for both the TWAP defined WPWP area (area = 12 787 700 km^2) and the Pacific Islands Forum area (area = 26 123 138 km^2).

Country	Percent of area	
	WPWP	PIF
Australia		11.2
Cook Islands		7.5
Fiji	2.8	4.9
France - Wallis and Futuna	1.6	
Indonesia	1.8	
Kiribati	9.2	13.2
Marshall Islands	11.2	7.6
Micronesia	22.9	11.5
Nauru	2.4	1.2
New Zealand		15.7
Niue		1.2
Palau	4.3	2.3
Papua New Guinea	7.5	9.2
Samoa		0.5
Philippines	1.2	
Solomon Islands	6.4	6.1
Tokelau	0.1	
Tonga	0.1	2.5
Tuvalu	5.9	2.9
USA - Northern Mariana Islands and Guam	0.7	
USA - Howland Island and Baker Island	2.5	
Vanuatu	0.6	2.4
High Seas	18.8	0.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary issues to be governed

The transboundary issues to be addressed by governance were identified in the above documents. The documents of the two phases of the Oceanic Fisheries Management Project focus on fisheries and associated biodiversity in high seas areas. As with other marine GEF IW systems marine pollution is treated as a transboundary issue.

- Fisheries
    - Highly Migratory Tunas
    - Coastal - small tunas and demersal species
- Biodiversity
    - Protected areas and migratory endangered species (cetaceans, seabirds, sea turtles) including benthic straddling and ABNJ
    - Habitat modification and destruction
- Pollution
    - Land Based Sources (LBS) of pollution
    - Marine Based Sources (MBS) of pollution, dumping, hazardous materials, exploration and waste from ships, including oil.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Noumea Convention - Convention for the Protection of the Natural Resources and Environment of the South Pacific – Secretariat of the Pacific Region Environmental Programme (SPREP)
    a. Protocol for the Prevention of Pollution of the South Pacific Region by Dumping
    b. Protocol Concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region
2. Apia Convention on Conservation of Nature in the South Pacific (1990)
3. Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean - South Pacific Regional Fisheries Management Organisation (SPRFMO)
4. WCPFC - Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean
    a. Technical and Compliance Committee (TCC)
    b. The Northern Committee (NC)
    c. Scientific Committee
5. South Pacific Forum Fisheries Agency Convention - Pacific Islands Forum Fisheries Agency (FFA) and subsidiary agreements

a. Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest
b. Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region and Multilateral NTSA Agreement on Strengthening Implementation of the Niue Treaty
c. Wellington Convention - Convention for the Prohibition of Fishing with Long Drift Nets in the South Pacific
d. Palau Arrangement for the Management of the Purse Seine Fishery in the Western and Central Pacific
e. US Treaty - Multilateral Treaty on Fisheries Between Certain Governments of the Pacific Island States and the Government of the United States of America

6. Secretariat of the Pacific Community (initially South Pacific Commission)
    a. Pacific Islands Regional Oceans Policy (PIROP), 2002
    b. Ocean Fisheries Programme (OFP)
    c. Coastal Fisheries Programme (CFP)
7. Pacific Islands Forum (PIF), its Council or Regional Organisations of the Pacific (CROP) and the CROP Marine Sector Working Group (MSWG)
    a. Framework for a Pacific Oceanscape (FPO), 2010

The extent to which the geographical area of coverage of these bodies and instruments overlaps the WPWP is shown in Table 2.

Table 2: Spatial overlap of transboundary arrangements with the Western Pacific Warm Pool area

Arrangement	Percent of arrangement in WPWP	Percentage of WPWP in arrangement	Fit of agreement to WPWP[1]	Percent of arrangement in PIF	Percentage of PIF in arrangement	Fit of agreement to PIF
Noumea Convention and Protocols	88	27	D	99	63	B
SPC	90	37	D	69	58	D
FFA	100	21	B	80	34	D
SPRFMO	17	4	D	<1	<1	NA
WCPFC	100	12	C	25	100	C
PIF	73	36	NA	NA	NA	NA
WPWP	NA	NA	NA	36	72	NA

The extent of country membership in these bodies and instruments for the WPWP is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Western Pacific Warm Pool and Pacific Islands Forum areas.								
Coastal Country	Noumea Convention	Noumea Dumping Protocol	Noumea Emergency Protocol	SPC	FFA	SPRFMO	WCPFC	PIF
Australia	B	B	B	C	B	B	B	C
Cook Islands	B	B	B	C	B	B	B	C
Federated States of Micronesia	B	B	B	C	B		B	C
Fiji	B	B	B	C	B		B	C
France[2]	B	B	B	C	N	N	B	N
Kiribati				C	B		B	C
Marshall Islands	B	B	B	C	B		B	C
Nauru	B	B	B	C	B		B	C
New Zealand[3]	B	B	B	C	B	B	B	C
Niue				C	B		B	C
Palau	C	C	C	C	B		B	C
Papua New Guinea	B	B	B	C	B		B	C
Samoa	B	B	B	C	B		B	C
Solomon Islands	B	B	B	C	B		B	C
Tonga				C	B		B	C
Tuvalu	C	C	C	C	B		B	C
United Kingdom	C	C	C	N	N		N	N
United States of America[4]	B	B	B	C	N	C	B	N
Vanuatu				C	B	B	B	C
% engagement	46	46	46	96	65	15	100	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[2] France: extends to French Polynesia, New Caledonia and Wallis and Futuna
[3] New Zealand extends to Tokelau
[4] United States of America extends to American Samoa, Guam and the Commonwealth of the Northern Mariana Islands

2.2.1 Assessment of issues

The individual assessments of the issues identified above are shown in Tables 4a-e. These assessments are summarized in Table 5.

Table 4a: Western Pacific Warm Pool[i] – Transboundary arrangement for fisheries – Highly Migratory Species

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	LME	3	IUCN	• Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The FFA oversees the implementation of several treaties and agreements relating to HMS (Nauru Agreement, Niue Treaty, and Multilateral NTSA Agreement on Strengthening Implementation of the Niue Treaty, Wellington Convention, Palau Arrangement, and U.S. Treaty). • Scores are for WCPFC, except D and I which is for SPC. • The role of the SPRFMO in high seas fisheries and biodiversity relative to that of the WCPFC is unclear
Policy decision-making	WCPFC Commission.	LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	LME	3		
Planning decision-making	WCPFC Commission.	LME	3		
Implementation	CPs WCPFC Secretariat FFA	LME National	1		
Review and evaluation	The Technical and Compliance Committee (TCC)	LME	2		
Data and information	SPC OFP	LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Western Pacific Warm Pool – Transboundary arrangement for fisheries – coastal - small tunas and demersal species					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	PIF-FPO, SPC-CFP	LME	2		• Insofar as can be discerned there is no structured policy process for coastal fisheries. Various organisations are de facto filling roles that if linked could comprise a policy process, although a planning decision-making mechanism is absent. • The potential role of the FFA in this mechanism is unclear. Although its mandate applies to all waters, its focus is exclusively HMS
Policy decision-making	PIF	LME	1		
Planning analysis and advice	SPC-CFP	LME	1		
Planning decision-making	CPs	National	0		
Implementation	CPs	National	0		
Review and evaluation	CPs	National	0		
Data and information	SPC-CFP	LME	3		
Overall total and % completeness >>			7/21 = 33%		

Table 4c: Western Pacific Warm Pool – Transboundary arrangement for pollution – LBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SPREP Secretariat IMO	LME	2		• There is no Noumea Convention protocol for LBS. Therefore, measures can only be addressed under the convention itself
Policy decision-making	Noumea Convention COP	LME	1		
Planning analysis and advice	SPREP Secretariat IMO	LME	1		
Planning decision-making	Noumea Convention COP	LME	2		
Implementation	CPs SPREP Secretariat	LME National	1		
Review and evaluation	SPREP Secretariat	LME	1		
Data and information	CPs SPREP Secretariat	LME National	2		
Overall total and % completeness >>			10/21 = 48%		

Table 4d: Western Pacific Warm Pool – Transboundary arrangement for pollution – MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SPREP Secretariat IMO	LME	1		• While there is a dumping protocol, other MBS pollution - hazardous materials, exploration and waste from ships, including oil - are addressed only by the convention itself.
Policy decision-making	Noumea Convention COP Dumping Protocol COP	LME	1		
Planning analysis and advice	SPREP Secretariat IMO	LME	1		
Planning decision-making	Dumping Protocol COP	LME	2		
Implementation	CPs SPREP Secretariat	LME National	1		
Review and evaluation	SPREP Secretariat	LME	1		
Data and information	CPs SPREP Secretariat	LME National	2		
Overall total and % completeness >>			9/21 = 43%		

Table 4e: Western Pacific Warm Pool – Transboundary arrangement for Biodiversity – general (protected areas and migratory endangered species (including benthic straddling and ABNJ)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	SPREP Secretariat	LME	2	• The FPO provides a policy context for this aspect of biodiversity conservation, but can it be considered as a policy adviser to SPREP • There are many NGOs active in promoting these aspects of biodiversity conservation (IUCN). • The Coral Triangle Initiative provides significant activity at a sub-regional level	• The Noumea convention covers specially protected areas and protection of wild flora and fauna, but there is no protocol to give effect to this aspect. • Whereas there is the Convention on Conservation of Nature in the South Pacific for which the SPC is Secretariat, it does not have very broad membership or appear to be very active. • The OFMP includes aspects of fishing impacts on seamounts, and bycatch of sharks, seabirds and sea turtles
Policy decision-making	Noumea Convention COP	LME	1		
Planning analysis and advice	SPREP Secretariat	LME	1		
Planning decision-making	SPREP Secretariat	LME	2		
Implementation	CPs SPREP Secretariat	LME National	1		
Review and evaluation	SPREP Secretariat	LME	1		
Data and information	CPs SPREP Secretariat	LME National	2		
Overall total and % completeness >>			10/21 = 48%		

Table 5: Pacific Warm Pool governance architecture - System summary[ii]					
IW category: Marine region	**Countries: see table 1**		**System name:** Western Pacific Warm Pool		**Region:** Western Pacific
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - HMS	all		86		WCPFC
Fisheries - coastal	all		25		SPC
Pollution - LBS	all		48		Noumea Convention
Pollution - MBS	all		43		
Biodiversity - general	all		48		Noumea Convention
	System architecture completeness index >>		51		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 10 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)					
Policy cycle stage	**Fisheries - HMS**	**Fisheries - coastal**	**Biodiversity**	**Pollution - LBS**	**Pollution - MBS**
Policy analysis and advice	PIF-FPO, SPC-CFP	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	SPREP Secretariat	SPREP Secretariat IMO	SPREP Secretariat IMO
Policy decision-making	PIF	WCPFC Commission.	Noumea Convention COP	Noumea Convention COP	Noumea Convention COP Dumping Protocol COP
Planning analysis and advice	SPC-CFP	The Technical and Compliance Committee (TCC) The Northern Committee (NC)	SPREP Secretariat	SPREP Secretariat IMO	SPREP Secretariat IMO

		Scientific Committee FFA			
Planning decision-making	CPs	WCPFC Commission.	SPREP Secretariat	Noumea Convention COP	Dumping Protocol COP
Implementation	CPs	CPs WCPFC Secretariat FFA	CPs SPREP Secretariat	CPs SPREP Secretariat	CPs SPREP Secretariat
Review and evaluation	SPC-CFP	The Technical and Compliance Committee (TCC)	SPREP Secretariat	SPREP Secretariat	SPREP Secretariat
Data and information	SPC-CFP	SPC OFP	CPs SPREP Secretariat	CPs SPREP Secretariat	CPs SPREP Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	0	0	0	0	0	0	1	0.1
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	1	1	1	1
3 and 5	1	1	1	1	1	1	1	1
4 and 5	1	1	1	1	1	1	1	1
Average	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.3 out of a possible 1.

3 Conclusions

The two arrangements for pollution and biodiversity that fall under the Noumea Convention are integrated under SPREP although there is a deficiency of protocols to give effect to the intent of the convention. The Pacific Islands Region has a well-structured mechanism for policy coordination and integration across all issues in the form of the Pacific Islands Forum. It is not clear that integration at the technical level is as well-structured, although there are many linkages and interaction among the relevant processes in this region, several of the supported by MOUs between agencies. This LME has been assigned an overall integration score of 1.0 due to the presence of the Pacific Islands Forum (PIF) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Pacific Warm Pool LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Pacific Warm Pool LME	Completeness	Integration	Engagement
	51%	1.0	64%

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

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Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Patagonian Shelf LME

1 The system to be governed

The system is the Patagonian Shelf LME, extending from 34° S at the northern end of the Rio De la Plata to 55° S at Tierra del Fuego in Argentina. This LME covers the entire coastline of Uruguay and Argentina and is approximately 1.2 million km^2. The marine jurisdiction of the LME is shared between the two countries according to Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XVI–55), so a review is not provided here. This assessment is also informed by 1999 GEF PRODOC for the project entitled "Environmental Protection of the Rio de la Plata and its Maritime Front: Pollution Prevention and Control and Habitat Restoration (FREPLATA)", its 2006 TDA for Policy Makers and SAP (2007).

Table 1. Percentage of Patagonia Shelf LME area taken up by the EEZ of each country and the High Seas (area = 1,164,280 km^2)

Country	Percent of LME area
Argentina	71.1
Uruguay	6.9
United Kingdom	20.2
High Seas	1.8

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the reviewed documents as follow:

- Fisheries
  - over-exploitation and collapse of Argentine hake
  - high percentage of bycatch and discards in both coastal and high seas fleets
- Pollution
  - chemical and petrochemical pollution;
  - direct and indirect industrial effluents and sewage discharges, either with an inadequate treatment or with no treatment at all
  - non-point sources (agricultural waste, etc);
- Biodiversity
  - appearance of invasive species
  - habitat modification from coastal erosion and alteration, dredging activities and sediment disposition

From a transboundary governance perspective, it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. 1973 Treaty of the Rio de la Plata and its Maritime Front
    a. CARP – Administrative Commission for the Rio de la Plata (1976)
    b. CTMFM – Binational Technical Commission for the Argentine-Uruguayan Maritime Front (1976)
    c. Joint CARP-CTMFM Consortium (1998) – Implementation Unit for FREPLATA
2. Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
4. Permanent Commission for the South Pacific (CPPS)
5. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Patagonia Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Patagonia Shelf LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)	1	98	D
Permanent Commission for the South Pacific (CPPS)	1	5	D
Treaty of the Rio de la Plata and its Maritime Fronts	76	16	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the Patagonia Shelf LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Patagonian Shelf LME					
Coastal countries in the LME	Agreements				
	CCSBT	CPPS	IAC	Rio de la Plata Treaty	ICCAT
Argentina	N	N	B	B	
Uruguay	N	N	B	B	B
United Kingdom	N	N		N	B
% engagement	0	0	67	100	67
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5

Table 4a: Patagonian Shelf LME[i] – Transboundary arrangement for fisheries – HMS (Southern Bluefin Tuna)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CCSBT - Extended Scientific Committee (ESC), WG - Ecologically-Related Species (ERS), Standing Committee for Finance and Administration	Supra-LME	3		None of the countries with marine jurisdiction in the LME are members of the CCSBT.
Policy decision-making	CCSBT - Commission	Supra-LME	3		
Planning analysis and advice	CCSBT - Extended Scientific Committee, WG - Ecologically-Related Species, Standing Committee for Finance and Administration	Supra-LME	3		
Planning decision-making	CCSBT - The Extended Commission	Supra-LME	3		
Implementation	Countries that are members and cooperating non-members Secretariat	National Supra-LME	2		
Review and evaluation	CCSBT- Compliance Committee Countries	Supra-LME National	2		
Data and information	The Extended Commission, ESC and WG-ERS Secretariat Compliance Committee, Countries	Supra-LME National	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b. Patagonian Shelf LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species other than Southern Blue Fin)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		Argentina is not a member of ICCAT
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4c. Patagonian Shelf LME – Transboundary arrangement for fisheries –EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		Relative complete policy cycle. While structure is present, funds for CARP and CTMFM limiting so scientific data collection not being done to the level expected.
Policy decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Planning analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		
Planning decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Implementation	Countries	National	2		
Review and evaluation	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	2		
Data and information	Countries CARP and CTMFM	National Sub-LME	2		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Patagonian Shelf LME – Transboundary arrangement for pollution – LBS and MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		Relative complete policy cycle. While structure is present, funds for CARP and CTMFM limiting so scientific data collection not being done to the level expected.
Policy decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Planning analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		
Planning decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Implementation	Countries	National	2		
Review and evaluation	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	2		
Data and information	Countries CARP and CTMFM	National Sub-LME	2		
Overall total and % completeness >>			18/21 = 86%		

Table 4e. Patagonian Shelf LME – Transboundary arrangement for biodiversity – Habitat Modification from dredging and deposition					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		Relative complete policy cycle. While structure is present, funds for CARP and CTMFM limiting so scientific data collection not being done to the level expected.
Policy decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Planning analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		
Planning decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Implementation	Countries	National	2		
Review and evaluation	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	2		
Data and information	Countries CARP and CTMFM	National Sub-LME	2		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Patagonian Shelf LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Patagonian Shelf LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries: Argentina, Uruguay, United Kingdom**	**System name: Patagonian Shelf**		**Region: South Atlantic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (Southern Bluefin Tuna)	3		90%		
Fisheries – HMS (Tuna and tuna-like species other than Southern Blue Fin)	3		86%		
Fisheries –EEZ	3		86%		
Pollution – LBS	3		86%		
Pollution - MBS	3		86%		
Biodiversity – habitat modification from dredging and deposition	3		86%		
Biodiversity – Specific (Turtles)	3		57%		
	System architecture completeness index >>		82%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)							
Policy cycle stage	**Fisheries – HMS (Southern Bluefin Tuna)**	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution - MBS**	**Biodiversity – Hab Mod**	**Biodiversity - Turtles**
Policy analysis and advice	CCSBT - Extended Scientific Committee (ESC), WG - Ecologically-Related Species (ERS), Standing Committee for Finance and Administration	ICCAT Standing Committee on Research and Statistics (SCRS)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	IAC Consultative and Scientific Committees
Policy decision-making	CCSBT - Commission	ICCAT Commission	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	IAC Consultative Committee and CoP
Planning analysis and advice	CCSBT - Extended Scientific Committee, WG - Ecologically-Related Species, Standing Committee for Finance and Administration	ICCAT SCRS and Species Panels	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	IAC Consultative and Scientific Committees
Planning decision-making	CCSBT - The Extended Commission	ICCAT Commission	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	IAC CoP
Implementation	Countries that are members and cooperating non-members Secretariat	Countries	Countries	Countries	Countries	Countries	IAC Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)							
Policy cycle stage	**Fisheries – HMS (Southern Bluefin Tuna)**	**Fisheries - HMS**	**Fisheries - EEZ**	**Pollution – LBS**	**Pollution - MBS**	**Biodiversity – Hab Mod**	**Biodiversity - Turtles**
Review and evaluation	CCSBT- Compliance Committee Countries	Conservation and Management Measures Compliance Committee (CMMCC)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	IAC Countries
Data and information	The Extended Commission, ESC and WG-ERS Secretariat Compliance Committee, Countries	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries CARP and CTMFM	Countries CARP and CTMFM	Countries CARP and CTMFM	Countries CARP and CTMFM	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	0	1	1	0.86
3 and 5	1	1	1	1	0	1	1	0.86
3 and 6	1	1	1	1	0	1	1	0.86
3 and 7	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	1	1	1	1	0	1	1	0.86
4 and 7	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	0	1	1	0.86
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.24	0.24	0.24	0.24	0	0.24	0.24	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the five issues is 0.2 out of a possible 1.

3 Conclusions

The two arrangements for high seas Southern Bluefin Tuna and the large pelagics in the Atlantic (CCBST and ICCAT) are separate arrangements, as is the arrangement for turtles (IAC). However, the fisheries, pollution and biodiversity arrangements in the areas within the EEZ of Uruguay and Argentina appear to be well integrated as a result of the Treaty of the Rio de la Plata.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Patagonian Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Patagonian Shelf LME	Completeness	Integration	Engagement
	82%	0.2	58%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

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[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Red Sea LME

1 The system to be governed

The system is the Red Sea LME is bordered by Djibouti, Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan and Yemen (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter III-6), so a review is not provided here. This assessment is also informed by the PRODOC.

Table 1. Percentage of Red Sea LME area taken up by the EEZ of each country and the High Seas (area = 456,127 km^2)

Country	Percent of LME area
Djibouti	0.1
Egypt	19.6
Eritrea	17.1
Israel	<0.1
Jordan	<0.1
Saudi Arabia	40.1
Sudan	14.4
Yemen	7.9
High Seas	0.8

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified Sherman and Hempel (2009) as follows:

- Fisheries
  - widespread illegal fishing and overexploitation
- Pollution
  - LBS – nutrients, chemicals, hydrocarbons
  - MBS - coastal and marine contamination from oil spills, marine transportation
- Biodiversity
  - decline in coral reefs
  - widespread coastal habitat destruction
  - degradation and decline of mangrove

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The Regional Convention for the Conservation of the Environment of the Red Sea and Gulf of Aden (The Jeddah Convention)
   a. Protocol concerning Regional Cooperation in Combating Pollution by Oil and Other Harmful Substances in cases of Emergency
   b. Protocol Concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden – Not yet in force

2. Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)
3. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
4. Action Plan for the Conservation of the Marine Environment and Coastal Areas of the Red Sea and the Gulf of Aden, 1976
5. East African Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Red Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Red Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
IOTC	1	100	C
Jeddah Convention and Protocols	43	100	C
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the Red Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Red Sea LME

LME coastal countries	Agreement			
	IOTC	Jeddah Convention	Jeddah Oil Spill Protocol	Dugong MOU
Djibouti		B	B	
Egypt		B	B	C
Eritrea	B			C
Israel	N			
Jordan	N	B	B	
Palestine	N	B	B	
Saudi Arabia		B	B	C
Sudan	B	B	B	C
Yemen	B	B	B	C
% engagement	50	100	100	56

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a: Red Sea LME[i] – Transboundary Arrangements for Fisheries – HMS (tuna and tuna like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		3 of the 9 states have signed but none have ratified IOTC. Given the low percent of high seas, is this likely not an issue? What about coastal pelagic?
Policy decision-making	IOTC - Commission	Supra-LME	1		
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		
Planning decision-making	IOTC - Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	National Supra-LME	2		
Data and information	Countries IOTC - Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4b: Red Sea LME – Transboundary Arrangement for Pollution - Land-Based Sources and Biodiversity - General					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Jeddah Convention - PERSGA Secretariat Partner IGOs	Supra-LME	1		While the Jeddah Convention has been ratified by 5 of the 9 countries and signed by an additional 2 countries, the LBS Protocol is not in force and the Biodiversity protocol has not been adopted. As such, the score used in the table is that assigned for the entire Convention What role does SACEP and the SASAP play in regional governance of pollution and biodiversity in this LME, if any?
Policy decision-making	Council	Supra-LME	1		
Planning analysis and advice	Jeddah Convention and LBS Protocol - PERSGA Secretariat Partner IGOs	Supra-LME	1		
Planning decision-making	Council	Supra-LME	1		
Implementation	Countries PERSGA Secretariat	National	1		
Review and evaluation	Council Committee for the Settlement of Disputes	Supra-LME	2		
Data and information	Countries PERSGA Secretariat	National Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Red Sea LME – Transboundary Arrangement for Pollution - Marine-Based Sources					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Jeddah Convention and Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Supra-LME	3		Signed at the time of the Convention, along with the Action Plan
Policy decision-making	PERGSA Council	Supra-LME	1		
Planning analysis and advice	Jeddah Convention and Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Supra-LME	3		
Planning decision-making	PERGSA Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	PERSGA Council	Supra-LME	2		
Data and information	Countries Marine Emergency Mutual Aid Centre	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4d: Red Sea LME – Transboundary Arrangement for Biodiversity – Specific (Marine Turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Policy decision-making	Meeting of Parties	Supra-LME	2		
Planning analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Planning decision-making	Meeting of Parties	Supra-LME	2		
Implementation	Countries	National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	Countries	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: Red Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Red Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Djibouti, Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan, Yemen**		**System name: Red Sea**		**Region: Western Indian Ocean**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – large highly migratory species (tuna and tuna like)	8		67%		
Pollution - Land-Based Sources	8		38%		
Pollution - Marine-Based Sources	8		62%		
Biodiversity – General	8		38%		
Biodiversity – Specific (Turtles)	8		52%		
Biodiversity – specific (dugong)	8		52%		CMS MOU
	System architecture completeness index >>		52%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Both the over-fishing and the habitat modification issue relating to biodiversity do not appear to have specific formal arrangements at the regional level for addressing these issues. However, it can be assumed that the Jeddah Convention addresses biodiversity at the general level.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)						
Policy cycle stage	**Fisheries - HMS**	**Pollution - MBS**	**Pollution - LBS**	**Biodiversity - General**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Jeddah Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Jeddah Convention - PERSGA Secretariat Partner IGOs	Jeddah Convention - PERSGA Secretariat Partner IGOs	Countries Secretariat Advisory Committee	MOU CPs
Policy decision-making	IOTC - Commission	Jeddah Council	Jeddah Council	Jeddah Council	Meeting of Parties	MOU CPs
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Jeddah Convention and Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Jeddah Convention and LBS Protocol - PERSGA Secretariat Partner IGOs	Jeddah Convention and LBS Protocol - PERSGA Secretariat Partner IGOs	Countries Secretariat Advisory Committee	MOU CPs
Planning decision-making	IOTC - Commission	Jeddah Council	Jeddah Council	Jeddah Council	Meeting of Parties	MOU CPs
Implementation	Countries	Countries PERSGA Secretariat	Countries PERSGA Secretariat	Countries PERSGA Secretariat	Countries	MOU CPs
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	Jeddah Council	Jeddah Council Committee for the Settlement of Disputes	Council Committee for the Settlement of Disputes	Secretariat	Secretariat
Data and information	Countries IOTC - Secretariat	Countries PERSGA Secretariat Marine Emergency Mutual Aid Centre	Countries PERSGA Secretariat	Countries PERSGA Secretariat	Countries	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	1	0	1	1	1	1	0.71
2 and 4	0	1	0	1	1	1	1	0.71
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	1	1	1	1
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the three issues is 0.2 out of a possible 1.

3 Conclusions

The two arrangements for pollution and for biodiversity (general) fall under the Jeddah Convention. However, there does not appear to be any specific regional arrangements for overfishing in general nor habitat degradation and its effect on biodiversity within the Red Sea and Gulf of Aden. The transboundary arrangement for turtles and their habitat in the Indian Ocean does not appear to be integrated formally with the other arrangements. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Red Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Red Sea LME	Completeness	Integration	Engagement
	52%	0.2	65%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Scotian Shelf LME

1 The system to be governed

The system is the Scotian Shelf LME. It is bordered by the Canadian province of Nova Scotia and extends offshore to the shelf break, more than 200 nautical miles from the coast. The area of this LME is 283,000 km^2 fall primarily under the jurisdiction of Canada as indicated in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIX - 60), so a review is not provided here.

Table 1. Percentage of Scotian Shelf LME area taken up by the EEZ of each country and the High Seas (area = 283,000 km^2)

Country	Percent of LME area
Canada	98.7
France (Saint Pierre and Miquelon)	0.4
High Seas	0.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 60 (Sherman and Hempel, 2009) as follows:

- Fisheries
  - overexploitation or collapse of commercially stocks; declines in abundance and sizes for many commercially exploited fish species
- Biodiversity
  - introduction of invasive species and pathogens through ballast water
- Pollution
  - (MBS) illegal spills and discharges (chronic introduction of oil from vessel traffic, marine debris, chemical contaminants from vessels and offshore hydrocarbon development activities)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)

3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Scotian Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Scotian Shelf LME (area = 282, 150 km^2)

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME[1]
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	4	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	1	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	100	C

The extent of country membership in these bodies and instruments for the Scotian Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Scotian Shelf LME

Coastal countries in the LME	Agreements				
	ICCAT	NAFO	NAMMCO	NASCO	ICES
Canada	B	B		B	B
France (Saint Pierre and Miquelon)	B	B			B
% engagement	100	100		50	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in Table 5

Table 4a. Scotian Shelf LME[1] – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Scotian Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Scotian Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Neither country is eligible to be full members without the expressed agreement of the 4 original signatory countries
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Scotian Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Scotian Shelf LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Canada, France**		**System name: Scotian Shelf LME**		**Region: NW Atlantic**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – EEZ/ABNJ	2		86%		NAFO
Fisheries – large pelagics (tunas and tuna-like)	2		86%		ICCAT
Fisheries - specific (marine mammals	2		71%		NAMMCO
Fisheries – specific (salmon)	2		57%		NASCO
Pollution – MBS (None)	2		0%		
Pollution – LBS (None)	2		0%		
	System architecture completeness index >>		50%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Issues relating to invasive species and marine pollution are not addressed specifically as transboundary issues between the countries in the LME. This is likely due to the LME being primarily within Canada's maritime domain and as such, dealt with nationally and at levels higher than the LME such as the case for ballast water discharges from international shipping.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-4d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	**Fisheries – EEZ/ABNJ**	**Fisheries - HMS**	**Fisheries - Specific**	**Fisheries - Specific - Marine Mammals**
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee
Planning decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMMCO Council Committee on Inspection and Observation
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

None of the four fisheries agreements (NAFO, ICCAT, NAMMCO and NASCO) have formal linkages identified across the different stages of the policy cycle.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Scotia Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Scotian Shelf LME	Completeness	Integration	Engagement
	50%	0	63%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
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Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
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3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
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Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Sea of Japan LME

1 The system to be governed

The system is the Sea of Japan LME. This includes the marine waters of four countries and a disputed area (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-25), so a review is not provided here. This assessment is also informed by Northwest Pacific Action Plan (UNEP 1994) and the NOWPAP website.

Table 1. Percentage of Sea of Japan LME area taken up by the EEZ of each country and the High Seas (area = 982,146 km^2)

Country[1]	Percent of LME area
Japan	43.5
North Korea[2]	9.2
Russia	31.1
South Korea[3]	9.4
Japan - South Korea disputed zone	6.7
High Seas	<0.1

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

2.1.1 Priority issues

The priority transboundary issues to be addressed by governance were identified in Sherman and Hempel (2009) and in the Northwest Pacific Action Plan (UNEP 1994):

- Fisheries
    - Shared small pelagics and demersal finfish and invertebrates
- Biodiversity
    - Marine invasive species
    - Marine protected areas
    - Habitat and community modification
- Pollution
    - LBS - marine litter, nutrients
    - Oil spills

In addition to the above transboundary issues there are relatively small fisheries for highly migratory species. Whereas, the area mandated for the West Central Pacific Fisheries Commission does cover the Sea of Japan LME (Table 2), few of the fisheries that it manages

[1]Sherman and Hempel (2009, Chapter X-25) indicate that China is a coastal country in this LME, but this does not appear to be the case.

[2]Democratic People's Republic of Korea

[3]Republic of Korea

actually extend into this LME. Therefore the relevance of this arrangement to the LME is low. However, it can be said that an arrangement for highly migratory species is in place for the LME.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. UNEP Northwest Pacific Action Plan – NOWPAP
    a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
    b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
    c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
    d. Data and Information Network RAC- DINRAC, Beijing, China
2. The North Pacific Marine Science Organization (PICES)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)[4]

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Sea of Japan LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Sea of Japan LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[5]
PICES	4	100	C
WCPFC	1	100	C
NOWPAP		100	C

The extent of country membership in these bodies and instruments for the Sea of Japan LME is shown in Table 3.

[4]Merger of former Marine Resource Conservation and Fisheries Working Groups

[5]A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Sea of Japan LME				
Coastal countries in the LME	Agreements			
	PICES	WCPFC	NOWPAP	APEC OFWG
Japan	B	B	C	C
North Korea		N	C	N
Russia	B		C	C
South Korea	B	B	C	C
% engagement	75	67	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed				

2.2.1 Assessment of issues

The transboundary arrangements covering the key issues outlined in tables 4 a – d. These are summarised in Table 5.

Table 4a: Sea of Japan LME[i] – Transboundary arrangement for fisheries – Shared small pelagics and demersal finfish and invertebrates					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	PICES, APEC-OFWG	Supra-LME	1		• There is no structured transboundary arrangement for fisheries other than tuna under the WCPFC, and as already noted the majority of tuna fisheries do not extend into the Sea of Japan. • There is some collaboration in fisheries science and assessment through PICES and countries may engage in some level of policy discussion through the APEC-OFWG.
Policy decision-making	Countries	National	0		
Planning analysis and advice	PICES, APEC-OFWG	Supra-LME	1		
Planning decision-making	Countries	National	0		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	0		
Data and information	PICES	Supra-LME	1		
Overall total and % completeness >>			3/21 = 14%		

Table 4b: Sea of Japan LME – Transboundary arrangement for biodiversity - Marine Protected Areas and marine invasive species,					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU	Supra-LME	2		• DINRAC's objectives are to develop a region-wide data and information exchange network, to promote regional cooperation and exchange of information on the marine and coastal environment in the NOWPAP region.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NOWPAP	Supra-LME	1		
Data and information	NOWPAP- DINRAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Sea of Japan LME – Transboundary arrangement for biodiversity – Habitat and community modification					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU	Supra-LME	1		• There does not appear to be any specialised part of NOWPAP focused on habitat and community modification. • For DINRAC's objectives see Table 4b.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP	Supra-LME	1		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NOWPAP	Supra-LME	0		
Data and information	NOWPAP- DINRAC	Supra-LME	1		
Overall total and % completeness >>			5/21 = 23%		

Table 4d: Sea of Japan LME – Transboundary arrangement for pollution – LBS and MBS (oil spills)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		• CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. • MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. • POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment. • For DINRAC's objectives see Table 4b.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Sea of Japan LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** Japan, North Korea, Russia, South Korea,		**System name:** Sea of Japan LME		**Region:** North Pacific
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – Shared small pelagics and demersal finfish and invertebrates	4		14		There is no identifiable arrangement
Biodiversity - marine protected areas and marine invasive species	4		38		These are treated as separate arrangements because there are different NOWPAP RACs involved
Biodiversity - habitat and community modification	4		23		
Pollution - LBS (marine litter, nutrients) and oil spills	4		38		
Pollution - MBS (oil spills)	4		38		
	System architecture completeness index >>		30		<< System priority for intervention

2.3 Assess meant of transboundary integration of arrangements within the systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4 a - d)				
Policy cycle stage	**Fisheries - Shared small pelagics and demersal finfish and invertebrates**	**Biodiversity - Marine invasive species, Marine Protected Areas**	**Biodiversity - Habitat and community modification**	**Pollution - LBS and oil spills**
Policy analysis and advice	PICES, APEC-OFWG	NOWPAP-RCU	NOWPAP-RCU	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM	NOWPAP-IGM
Planning analysis and advice	PICES, APEC-OFWG	NOWPAP	NOWPAP	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM	NOWPAP-IGM
Implementation	Countries	Countries	Countries	Countries
Review and evaluation	Countries	NOWPAP	NOWPAP	CEARAC, MERRAC
Data and information	PICES	NOWPAP- DINRAC	NOWPAP- DINRAC	DINRAC, MERRAC, CEARAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	0	1	1	0.9
2 and 4	1	1	1	1	0	1	1	0.9
2 and 5	1	1	1	1	0	1	1	0.9
3 and 4	1	1	1	1	0	1	1	0.9
3 and 5	1	1	1	1	0	1	1	0.9
Average	0.6	0.6	0.6	0.6	0.0	0.6	0.6	0.5

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.5 out of a possible 1. The appearance of high integration among arrangements 2, 3, 4 and 5 arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal

standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal.

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The absence of North Korea from the arrangements weakens them despite the fact that North Korea's portion of the LME is relatively small (Table 1).

3 Conclusions

There is essentially no transboundary fisheries arrangement. However, PICES does provide opportunity for transboundary cooperation in assessment in science. The fact that there is no regional seas convention covering the area, only an action plan seriously weakens capacity for transboundary governance in areas relating to biodiversity and pollution. There is the potential for integration of pollution and biodiversity issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any organisation other than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Sea of Japan LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Sea of Japan LME	Completeness	Integration	Engagement
	30%	0.5	88%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Sea of Okhotsk LME

1 The system to be governed

The system is the Sea of Okhotsk LME. This includes the marine waters of Japan and Russia as shown in Table 1; as well as a disputed area and a small but significant area of high seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-26), so a review is not provided here. This assessment is also informed by the GIWA assessment (Alekseev et al 2006).

Table 1. Percentage of Sea of Okhotsk LME area taken up by the EEZ of each country and the High Seas (area = 1,556,459km^2)

Country	Percent of LME area
Disputed	4.1
Japan	2.1
Russia	91.3
High Seas	2.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary issues to be governed

Although this is a transboundary LME (Table 1), the majority of the LME lies within Russia's EEZ. Therefore, there are few significant transboundary issue to be addressed by governance in this LME. Fisheries are important in this area, but their management is for the most part at the national level, by Russia.

Whereas, the area covered by the West Central Pacific Fisheries Commission (WCPFC), which has the mandate for management of tunas and billfishes in the western Pacific, does cover the Sea of Okhotsk LME (Table 2), the fisheries that it manages are not a significant issue in this LME. Therefore the relevance of the WCPFC to the LME is minor. However, it can be said that an arrangement for highly migratory species is in place for the tuna and billfish stocks in this LME.

Biodiversity issues identified by Sherman and Hempel (2009) for this LME are primarily Russian national issues. Given that the Kuril Islands are disputed, it is not clear whether biodiversity in this area should be considered a transboundary issue. If most biodiversity threats are coastal in nature, or due to habitat damage from fishing within EEZs then the issue cannot be considered to be transboundary. Pollution issues affecting marine waters are all considered to be transboundary.

The issue identified as requiring transboundary governance is:

- Pollution – LBS and MBS

There may be transboundary fisheries resources but these are not identified and the issue is likely to be a small one given the preponderance of the area that belongs to Russia. This does not consider the need for a mechanism for managing coastal resources in the disputed area.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. UNEP Northwest Pacific Action Plan – NOWPAP
    a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
    b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
    c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
    d. Data and Information Network RAC- DINRAC, Beijing, China
2. Arctic Council (AC)
3. The North Pacific Marine Science Organization (PICES)
4. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)[1]
5. North Pacific Anadromous Fisheries Commission (NPAFC)[2]

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Sea of Okhotsk LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Sea of Okhotsk LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[3]
AC	0.2	2.6	D
PICES	6	100	B
NPAFC	<1	3	D
WCPFC	1	62	D
NOWAP			

The extent of country membership in these bodies and instruments for the Sea of Okhotsk LME is shown in Table 3.

[1] Merger of former Marine Resource Conservation and Fisheries Working Groups

[2] Applies to the High Seas area

[3] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Sea of Okhotsk LME					
Coastal countries in the LME	Agreements				
	AC	PICES	NPAFC	WCPFC	NOWPAP
Japan	N	B	B	B	C
Russia	C	B	B		C
% engagement	100	100	100	50	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Table 4a. They are summarised in Table 5

Table 4: Sea of Okhotsk LME[i] – Transboundary arrangement for pollution – LBS and MBS (oil spills)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		• CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. • MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. • POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Sea of Okhotsk LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** Japan, Russia		**System name:** Sea of Okhotsk LME		**Region:** North Pacific
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Pollution – LBS			38		NOWPAP
Pollution – MBS (oil spills)			38		
	System architecture completeness index >>		38%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 4a) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)	
Policy cycle stage	**Pollution –** LBS and MBS
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	NOWPAP-IGM
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	NOWPAP-IGM
Implementation	Countries
Review and evaluation	CEARAC, MERRAC
Data and information	DINRAC, MERRAC, CEARAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	1	1	1	1	0	1	1	0.9
Average	1	1	1	1	0	1	1	0.9

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the two issues is 0.9 out of a possible 1. This is because the only two issues are under the same organisation NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal.

No transboundary integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found.

3 Conclusions

The fact that there is no regional seas convention covering the area, only an action plan, seriously weakens capacity for transboundary governance in areas relating to pollution and biodiversity. There is no indication of transboundary integration, other than through cooperation in science. There is the potential for integration of pollution issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any other transboundary organisation than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Sea of Okhotsk LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Sea of Okhotsk LME	Completeness	Integration	Engagement
	38%	0.9	100%

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] **Policy cycle stage**: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the South Brazil Shelf LME

1 The system to be governed

The system is the South Brazil Shelf LME which extends along the eastern coast of South America from 22°S to 34°S. While the definition of the LME results in only Brazil having a coastline bordering the LME, Uruguay also has jurisdiction over a tiny fraction of the LME (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XVI-54), so a review is not provided here.

Table 1. Percentage of South Brazil Shelf LME area taken up by the EEZ of each country and the High Seas (area = 563,923 km^2)

Country	Percent of LME area
Brazil	98.3
Uruguay	1.2
High Seas	0.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the profile of the LME as follows:

- Fisheries
  - over-exploitation of nearshore pelagic and demersal fish stocks
  - destructive fishing practices including discards and bycatch
  - potential for expansion of oceanic pelagic fisheries
- Pollution
  - eutrophication, sedimentation, pesticides, heavy metals
  - HABs, microbial and parasitic leading to beach closures, fish kills
- Biodiversity
  - changes in ecosystem structure
  - habitat modification resulting in loss of marshland, mangroves and rocky shores, smothering of benthos, anoxic zones

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. International Convention for the Conservation of Atlantic Tuna (ICCAT)

2. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the South Brazil Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the South Brazil Shelf LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the South Brazil Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the South Brazil Shelf LME		
Coastal countries in the LME	Agreements	
	ICCAT	IAC
Brazil	B	B
Uruguay	B	B
% engagement	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed		

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-b. They are summarised in Table 5.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a. South Brazil Shelf LME[i] – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		Uruguay has only signed the Convention, not ratified
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: South Brazil Shelf LME – Transboundary Arrangements for Biodiversity – Specific (Turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both countries have ratified the Convention
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: South Brazil Shelf LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Brazil, Uruguay**		**System name: South Brazil Shelf**		**Region: ??**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – tunas and tuna-like species	2		86%		
Biodiversity - Turtles	2		57%		
Pollution – MBS	2		0%		
Pollution - LBS	2		0%		
	System architecture completeness index >>		36%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Given the extremely small component of the LME that is under Uruguay's jurisdiction, it is not surprising that the issues confronting the LME do not appear to be addressed in a transboundary manner.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-b) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-b)		
Policy cycle stage	**Fisheries - HMS**	**Biodiversity - Turtles**
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	IAC Consultative and Scientific Committees
Policy decision-making	ICCAT Commission	IAC Consultative Committee and CoP
Planning analysis and advice	ICCAT SCRS and Species Panels	IAC Consultative and Scientific Committees
Planning decision-making	ICCAT Commission	IAC CoP
Implementation	Countries	IAC Countries
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	IAC Countries
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

Neither of the two arrangements have any formal linkages although both species that they address are highly migratory pelagic species, one of high commercial value and one for conservation purposes. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the South Brazil Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

South Brazil Shelf LME	Completeness	Integration	Engagement
	36%	0	100%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
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Decision-making (policy and management):
0 = No decision-making mechanism[vi]
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2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
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Data and information:
0 = No DI mechanism
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2 = DI centrally coordinated, reviewed and shared[ix]
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End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

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System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the South China Sea LME

1 The system to be governed

The system is the South China Sea LME which covers an area of approximately 3.1 million km^2. Brunei-Darussalam, China, Paracel Islands, Spratly Islands, Indonesia, Malaysia, Philippines, Singapore, Singapore, Taiwan and Vietnam are the countries bordering this LME (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter VIII-15), so a review is not provided here. This assessment is also informed by the TDA 2000, Strategic Action Program (SAP) 2008 and PRODOC.

Table 1. Percentage of South China Sea LME area taken up by the EEZ of each country and the High Seas (area = 3,139,900 km^2)

Country	Percent of LME area
Brunei-Darussalam	--
China	10.6
Paracel Islands	9.2
Spratly Islands	13.8
Indonesia	17.0
Malaysia	9.1
Philippines	12.8
Singapore	0.0
Taiwan	7.9
Vietnam	18.4
High Seas	1.3

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hemple (2009), the TDA (2000) and the SAP (2008) as including:

- Fisheries
  - exploitation of migratory and pelagic species (excessive bycatch)
- Habitat Modification
  - depletion of coral reefs, decline in mangroves, damaged seagrass habitats
  - massive coastal habitat destruction
- Biodiversity
  - endangered species resulting from large-scale mangrove decline, reef degradation
- Pollution
  - LBS - increase in sediments, severe solid waste (localized), hydrocarbons
  - MBS - ship based sources (moderate pollution from spills, with episodic discharges from shipping and occasional spills from oil exploration and production)

2.2 Identify arrangements for each transboundary issue

The countries involved in the governance of the South China Sea LME share concerns about the marine environment and an awareness of the importance of the Sea as a source of protein for the growing coastal populations. The South China Sea LME is included as part of the UNEP-administered East Asian Regional Seas Programme. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
3. South East Asian Fisheries Development Center (SEAFDEC)
4. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
5. Coordinating Body on the Seas of East Asia (COBSEA)
6. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
7. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
8. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
9. Strategic Action Programme for the South China Sea, 2008
10. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
11. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the South China Sea LME is shown in Table 2

Table 2: Spatial overlap of transboundary agreement with the South China Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[1]
Asia Pacific Fisheries Commission (APFIC)	23	100	C
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	4	73	D
South East Asian Fisheries Development Center (SEAFDEC)	9	61	D
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean	3	100	C

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

(WCPFC)			
Coordinating Body on the Seas of East Asia (COBSEA)		100	C
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the South China Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the South China Sea LME

LME coastal countries	Agreement							
	APFIC	FFA	SEAFDEC	WCPFC	COBSEA	PEMSEA	IOSEA	Dugong
China	B	N	N	B	C	C	N	
Indonesia	B	N	C	C	C	C	C	
Malaysia	B	N	C		C	C	C	
Philippines	B	N	C	B	C	C	C	C
Singapore		N	C	N	C	C	N	
Taiwan	N	N	N	N	N	N	N	N
Vietnam	B	N	C		C	C	C	
% engagement	83	0	100	40	100	100	100	17

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a: South China Sea LME[1] – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	• Only 1 country has ratified the WCPF Agreement. What the implications of this, if any, given that there is negligible high seas area in the LME? • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the South China Sea LME, none of the countries of this LME are members. What are the implications of this for this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: South China Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: South China Sea LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity – Habitat Modification					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: South China Sea LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: South China Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: South China Sea LME governance architecture - System summary[ii]					
IW category: Marine region		**Countries:** Brunei-Darussalam, China, Indonesia, Malaysia, Paracel Islands, Philippines, Singapore, Spratly Islands, Taiwan, Viet Nam	**System name: South China Sea**		**Region: East Asia**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (Tuna and tuna-like species)	7		90%		
Fisheries – EEZ	7		38%		
Pollution - LBS	7		38%		
Pollution – MBS	7		38%		
Biodiversity – Hab Mod	7		38%		
Biodiversity – Specific (Turtles)	7		52%		
Biodiversity – specific (dugong)	7		52%		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)							
Policy cycle stage	**Fisheries – HMS**	**Fisheries – EEZ**	**Pollution – LBS**	**Pollution - MBS**	**Biodiversity – Hab Mod**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.57
3 and 5	1	1	1	0	0	1	0	0.57
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0	0	0.14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries in the areas (WCPFC and APFIC) each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to be any formal connection between the two arrangements, possibly since they have different areas of competence. However, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However neither of these “within national jurisdiction” arrangements appears to be integrated with each other or with the tuna

arrangement. Similarly, the specific biodiversity arrangement for turtles does not appear to be integrated with the other arrangements in the LME. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the South China Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

South China Sea LME	Completeness	Integration	Engagement
	50%	0.1	68%

4 References

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Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Southeast U.S. Continental Shelf LME

1 The system to be governed

The system is the Southeast U.S. Continental Shelf LME. This includes the marine waters of the USA and the Bahamas (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter XV-51), so a review is not provided here.

Table 1. Percentage of Southeast U.S. Continental Shelf LME area taken up by the EEZ of each country and the High Seas (area =299,127 km^2)

Country	Percent of LME area
Bahamas	15.4
United States	86.1
High Seas	0.8

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

Sherman and Hempel (2009) do not identify any transboundary issues other than highly migratory fishery species (tunas and tuna-like species). From fisheries perspective the landings are overwhelmingly from the USA and most of the major fisheries are managed at the national and state level. Similarly, fisheries within the waters of the Bahamas are likely to be mainly for sedentary species and not to require transboundary arrangements. An exception may be the deep slope snappers and groupers in areas close to the boundary between the two countries.

Whereas, pollution is being seen as a transboundary issue for all LMEs, the majority of land-based and marine-based pollution within this LME is likely to come from US sources, and thus to be covered by their national and state of governance arrangements.

Therefore, the key transboundary issues to be addressed by governance are considered to be:

- Fisheries
  - HMS (tunas and tuna-like species)
- Pollution
  - LBS and MBS
- Biodiversity
  - Specific (sea turtles)

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Cartagena Convention – Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).
    a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region (Oil Spills Protocol);
    b. Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region (SPAW Protocol)
    c. Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol)
2. WECAFC - FAO Western Central Atlantic Fishery Commission
3. ICCAT - International Commission for the Conservation of Atlantic Tunas
4. Caribbean Regional Fisheries Mechanism (CRFM)
5. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Southeast U.S. Continental Shelf LME is shown in Table 2.

Table 1: Spatial overlap of transboundary agreements with the Southeast U.S. Continental Shelf LME.

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
Cartagena Convention and Protocols	2	43	D
ICCAT	<1	100	B
WECAFC)	2	99	D
CRFM	2	15	D
IAC		100	C

The extent of country membership in these bodies and instruments for the Southeast U.S. Continental Shelf LME is shown in Table 3.

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Southeast U.S. Continental Shelf LME

Coastal countries in the LME	Agreements							
	Cartagena Convention	Cartagena Oil Spills Protocol	Cartagena LBS Protocol	Cartagena SPAW Protocol	ICCAT	WECAFC	CRFM	IAC
Bahamas	B	B	B			C	B	
USA	B	B	B	B	B	C	N	B
% engagement	100	100	100	50	50	100	100	50

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-c. They are summarised in Table 5

Table 4a: Southeast U.S. Continental Shelf LME[i] – Transboundary arrangement for fisheries - tuna					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3	International Game fish Foundation (IGF), International Billfish Foundation (IBF) WECAFC CRFM	• Both countries are ICCAT members • Bahamas only allows recreational fishing for tunas and tuna-like species
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4b: Southeast U.S. Continental Shelf LME – Pollution – LBS and MBS					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC)	LME	3		The policy process for the Cartagena convention L BS protocol is primarily focused in the Caribbean sea, North Brazil shelf, and Gulf of Mexico LMEs. Governance of L BS pollution emanating from mainland USA is viewed largely as an issue for the US Federal and State governments.
Policy decision-making	Cartagena Convention IGM LBS COP	LME	1		
Planning analysis and advice	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	LME	2		
Planning decision-making	Cartagena Convention LBS COP	LME	1		
Implementation	CPs Cartagena Convention RCU RACs	LME	2		
Review and evaluation	LBS STAC	LME	2		
Data and information	CP Cartagena Convention RCU RAC	LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4c: Southeast U.S. Continental Shelf LME – Biodiversity – specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Consultative Committee Scientific Committee	Supra-LME	2		IAC is not a very active organisation
Policy decision-making	COP Consultative Committee	Supra-LME	3		
Planning analysis and advice	Consultative Committee Scientific Committee	Supra-LME	2		
Planning decision-making	COP Consultative Committee	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	1		
Data and information	Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Southeast U.S. Continental Shelf LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** USA, Bahamas		**System name: Southeast US Continental Shelf**		**Region:** Western Atlantic
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (tunas and tuna-like species)	2		81		ICCAT
Pollution - LBS	2		62		Cartagena - LBS
Pollution - MBS	2		62		Cartagena – Oil spills
Biodiversity – specific (sea turtles)	2		57		IAS
	System architecture completeness index >>		65		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4 a - c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)			
Policy cycle stage	**Fisheries** - HMS	**Pollution** – LBS, MBS	**Biodiversity – specific**
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC)	Consultative Committee Scientific Committee
Policy decision-making	ICCAT Commission	Cartagena Convention IGM LBS COP	COP Consultative Committee
Planning analysis and advice	ICCAT SCRS and Species Panels	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Consultative Committee Scientific Committee
Planning decision-making	ICCAT Commission	Cartagena Convention LBS COP	COP Consultative Committee
Implementation	Countries	CPs Cartagena Convention RCU RACs	Countries

Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LBS STAC	Countries
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	CP Cartagena Convention RCU RAC	Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	1	1	1	1
2 and 4	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
Average	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1. There do not appear to be any bilateral arrangements between the USA and Bahamas with regard to transboundary issues in this LME[2]. The fact that implementation and monitoring of ICCAT decisions are solely the responsibility of countries seriously weakens this arrangement.

3 Conclusions

Only the two arrangements for pollution in the areas within national jurisdiction are closely connected under the Cartagena Convention. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

[2] Rebecca Shuford, email, 2014 02 28

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Southeast U.S. Continental Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Southeast U.S. Continental Shelf LME	Completeness	Integration	Engagement
	65%	0.2	81%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view.

Sherman, K. and Hempel, G. [Eds]. 2009.The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182.United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Sulu-Celebes Sea LME

1 The system to be governed

The system is the Sulu-Celebes Sea LME comprised of the Sulu and Celebes Seas located in the tropical seas of Asia. This semi-enclosed LME is bounded by the coasts of Malaysia, the Philippines and Indonesia, but most of the LME falls within the archipelagic waters of either the Philippines or Indonesia (Table 1). The LME covers an area of about one million km^2

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VIII-16, so a review is not provided here. This assessment is also informed by the PRODOC and the Regional Strategic Action Program (2013).

Table 1. Percentage of Sulu-Celebes Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,003,640 km^2)

Country	Percent of LME area
Indonesia	32.5
Malaysia	3.6
Philippines	62.9
High Seas	1.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues identified by Sherman and Hempel (2009) and outlined in the SAP (2103) to be addressed by governance include:

- Fisheries
  - decline of demersal and pelagic fish and invertebrate populations
  - presence of by-catch of endangered or threatened species
- Biodiversity/Habitat Modification
  - destruction of coral reefs by blast-fishing and trawling
  - severe degradation , extensive degradation of mangroves and coral reefs
  - high percentage of species at risk of extinction (20-30%)
  - death of seagrass beds and coral reefs due to excessive freshwater that lower the salinity of coastal waters
- Pollution
  - LBS - high sedimentation; sewage, agriculture, aquaculture, and forest clearing; significant eutrophication in enclosed areas leading to HABs and concomitant fish kills
  - MBS - marine pollution from shipping activities

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
3. South East Asian Fisheries Development Center (SEAFDEC)
4. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
5. Coordinating Body on the Seas of East Asia (COBSEA)
6. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
7. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
8. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
9. Strategic Action Programme for the Sulu-Celebes Large Marine Ecosystem, 2013
10. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
11. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Sulu-Celebes Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Sulu-Celebes Sea LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
Asia Pacific Fisheries Commission (APFIC)	7	100	C
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	2	100	C
South East Asian Fisheries Development Center (SEAFDEC)	5	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	1	100	C
Coordinating Body on the Seas of East Asia (COBSEA)		100	C
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the Sulu-Celebes Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Sulu-Celebes Sea LME

LME coastal countries	Agreement							
	APFIC	FFA	SEAFDEC	WCPFC	COBSEA	PEMSEA	IOSEA	Dugong
Indonesia	B	N	C	C	C	C	C	
Malaysia	B	N	C		C	C	C	
Philippines	B	N	C	B	C	C	C	C
% engagement	100	0	100	33	100	100	100	33

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a: Sulu-Celebes Sea LME[i] – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	• Only 1 country has ratified the WCPFC Agreement. What the implications of this, if any, given that there is negligible high seas area in the LME? • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the Sulu-Celebes Sea LME, none of the countries of this LME are members. What are the implications of this for this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: Sulu-Celebes Sea LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Sulu-Celebes Sea LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d:Sulu-Celebes Sea LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: Sulu-Celebes Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Sulu-Celebes Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Indonesia, Malaysia, Philippines**		**System name: Sulu-Celebes Sea**		**Region: East Asia**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries – HMS (Tuna and tuna-like species)	3		90%		
Fisheries – EEZ	3		38%		
Pollution - LBS	3		38%		
Pollution – MBS	3		38%		
Biodiversity – Hab Mod	3		38%		
Biodiversity - Specific	3		52%		
Biodiversity – specific (dugong)	3		52%		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)							
Policy cycle stage	**Fisheries – HMS**	**Fisheries – EEZ**	**Pollution – LBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific**	**Biodiversity - specific (dugongs)**
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implement ation	Review and evaluation	Data and informat-ion	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.57
3 and 5	1	1	1	0	0	1	0	0.57
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0	0	0.14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries (WCPFC and APFIC) in the areas each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to me any formal connection between the two arrangements, possibly since they have different areas of competence. However, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However neither of these within national

jurisdiction arrangements appears to be integrated with each other or with the tuna arrangement.

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Sulu Celebes Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Sulu Celebes Sea LME	Completeness	Integration	Engagement
	50%	0.1	71%

4 References

Sulu Sulawesi Marine Ecoregion Tri-National Committee. 2013. Strategic Action Program for the Sulu-Celebes Sea Large Marine Ecosystem. Prepared for the Sulu-Celebes Sustainable Fisheries Management Project under GEF/UNDP/UNPOS.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

[v] This can be internal or external

[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the West Bering Sea LME

1 The system to be governed

The system is the West Bering Sea LME. The West Bering Sea LME lies off Russia's northeast coast and borders the Aleutian Trench. The LME has a surface area of just over 720,000 km^2, reduced from the former 2 million km^2 due to revisions in the boundaries of the LME. The newly revised West Bering Sea LME includes the marine waters primarily under the jurisdiction of Russia at over 90%, with the US and high seas making up the remainder (Table 1).

Table 1. Percentage of West Bering LME area taken up by the EEZ of each country and the High Seas (area = 721,940 km^2)

Country	Percent of LME area
Russia	90.4
US	7.9
High Seas	1.8

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter X-27), so a review is not provided here.[1] Additional information on issues affecting the LME was obtained from the website of the international NGO, International Bering Sea Forum at www.beringseaforum.org

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as:

- Fisheries
  - over-exploitation primarily from factory trawlers and IUU fishing
  - poaching of salmon eggs
- Pollution
  - oil and gas exploration and mining
  - Hg and POPs from long-range transport
- Biodiversity
  - declines in marine mammals and seabirds
  - habitat modification – mining and seabed alteration from trawling

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

[1] Chapter 27 of the Sherman and Hempel (2009) report describes the LME based on its old boundaries?

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The North Pacific Marine Science Organization (PICES)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Agreement on the Conservation of Polar Bears (ACPB)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the West Bering Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the West Bering Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME[2]
Arctic Council (AC)	2.9	73.8	D
The North Pacific Marine Science Organization (PICES)	3	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	<1	26	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

The extent of country membership in these bodies and instruments for the West Bering Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the West Bering Sea LME

Coastal countries in the LME	Agreements			
	AC	ACPB	PICES	WCPFC
Russia	C	B	B	
United States	C	B	B	B
% engagement	100	100	100	50

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption
C = agreement to cooperate by signing
N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-b. They are summarised in Table 5

[2] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: West Bering LME[i] – Transboundary Arrangement for Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC) PICES?	All countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
		Overall total and % completeness >>	14/21 = 67%		

Table 4b: West Bering Sea LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	Both coastal states are members of ACPB although Russia has only signed, not ratified The arrangement only covers some 18% of the eastern part of the LME
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Table 5: West Bering Sea LME governance architecture - System summary[ii]					
IW category: Marine region	**Countries: Russia, United States**		**System name: West Bering Sea**		**Region: North Polar**
Complete these columns then assess issues using the arrangements tables			*After completing the arrangements tables, complete these columns*		
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Pollution (LBS)	2		67%		
Pollution (MBS)	2		67%		
Biodiversity – General	2		67%		
Biodiversity – Specific (Polar Bear)	2		38%		
	System architecture completeness index >>		60%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Issues such as the poaching of salmon eggs, while clearly having a transboundary effect, are not discussed since these are presumably primarily dealt with at the national level.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-b) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 4a-b)				
Policy cycle stage	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific (Polar Bear)**
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts
Policy decision-making	Arctic Council	Arctic Council	Arctic Council	ACPB- Countries
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group	Emergency preparedness, Prevention and response; Protection of Arctic Marine	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces;	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 4a-b)				
Policy cycle stage	**Pollution - LBS**	**Pollution - MBS**	**Biodiversity - General**	**Biodiversity - Specific (Polar Bear)**
	Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Senior Arctic Officials (SAO)	
Planning decision-making	Arctic Council	Arctic Council	Arctic Council	ACPB Countries
Implementation	Countries	Countries	Countries	ACPB Countries
Review and evaluation	Arctic Council	Arctic Council	Arctic Council	ACPB - IUCN Polar Bear Specialist Group
Data and information	Countries Secretariat	Countries Secretariat	Countries Secretariat	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	0	1	0	1	0	1	1	0.57
1 and 3	0	1	0	1	0	1	1	0.57
1 and 4	0	0	0	0	0	0	0	0
2 and 3	0	1	0	1	0	1	1	0.57
2 and 4	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
Average	0	0.5	0	0.5	0	0.5	0.5	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.3 out of a possible 1.

3 Conclusions

Transboundary issues of concern in this LME are addressed by the Arctic Council, primarily due to its integrative nature. However, while it does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, its policy coordination role with respect to fisheries is weak. Also, it should also be noted that the majority of the LME is within Russia's marine jurisdiction.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the West Bering Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

West Bering Sea LME	Completeness	Integration	Engagement
	60%	0.3	100%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
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1 = Decisions are recommendations to countries
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3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i] Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

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Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

[ii] Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

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System architecture completeness: Average for issues.

[iii] The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

[iv] Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

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[vi] This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

[vii] This means support from regional programmes or partner organizations arranged via secretariat

[viii] For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

[ix] In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

[x] Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Yellow Sea LME

1 The system to be governed

The system is the Yellow Sea LME. This includes the marine waters of the countries as shown in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-28), so a review is not provided here. This assessment is also informed by the TDA, PRODOC, and SAP (UNDP/GEF 2007, UNDP/GEF 2009).

Table 1. Percentage of Yellow Sea LME area taken up by the EEZ of each country and the High Seas (area = 435,539 km^2)

Country	Percent of LME area
China	61.6
North Korea	5.5
South Korea	32.3
High Seas	0.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA and SAP (UNDP/GEF 2007):

- Fishing effort exceeding ecosystem carrying capacity
- Mariculture facing unsustainable problems
- Pollution and contaminants
- Eutrophication
- Harmful algal blooms (habs)
- Habitat loss and degradation
- Change in ecosystem structure
- Jellyfish blooms
- Climate change-related issues

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. UNEP Northwest Pacific Action Plan – NOWPAP
    a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;

b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea

c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.

d. Data and Information Network RAC- DINRAC, Beijing, China

2. Yellow Sea Partnership established by the YSLME Project and intended as a precursor to the YSLME Commission
3. The North Pacific Marine Science Organization (PICES)
4. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
5. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
6. Strategic Action Programme (SAP) for the Yellow Sea Large Marine Ecosystem, 2009

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Yellow Sea LME is shown in Table 2. The country membership in these bodies and instruments for the Yellow Sea LME is shown in Table 3.

Table 2: Spatial overlap of transboundary agreement with the Yellow Sea LME

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME[1]
PICES	2	100	C
WCPFC	<1	100	C
NOWPAP		100	C

[1] A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Yellow Sea LME			
Coastal countries in the LME	Agreements		
	PICES	WCPFC	NOWPAP
China	B	B	C
North Korea		N	C
South Korea	B	B	C
% engagement	67	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed			

2.2.1 Assessment of issues

The transboundary arrangements covering the key issues outlined in tables 4 a – c. These are summarised in table 5.

Table 4a: Yellow Sea LME[i] – Transboundary arrangement for fisheries – all resources within EEZs					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	PICES	Supra-LME	1		• There is no structured transboundary arrangement for fisheries other than tuna under the WCPFC, and as already noted the majority of tuna fisheries do not extend into the Yellow Sea. • There is some collaboration in fisheries science and assessment through PICES and countries may engage in some level of policy discussion through the APEC-OFWG. • The YSLME Project has developed a YS Partnership which has promoted a lot of cooperation
Policy decision-making	Countries	National	0		
Planning analysis and advice	PICES	Supra-LME	1		
Planning decision-making	Countries	National	0		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	0		
Data and information	PICES	Supra-LME	1		
Overall total and % completeness >>			3/21 = 14%		

Table 4b: Yellow Sea LME – Transboundary arrangement for pollution – LBS and MBS (oil spills)					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		• CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. • MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. • POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment. • For DINRAC's objectives see Table 5a.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Yellow Sea LME – Transboundary arrangement for (a) biodiversity - Marine Protected Areas and marine invasive species, and (b) biodiversity – Habitat and community modification					
Policy cycle stage	**Responsible organisation or body**			**Other key organisations**	**Observations**
	Names	**Scale level(s)**	**Score**		
Policy analysis and advice	NOWPAP-RCU	Supra-LME	2		• DINRAC's objectives are to develop a region-wide data and information exchange network, to promote regional cooperation and exchange of information on the marine and coastal environment in the NOWPAP region. • There does not appear to be any specialised part of NOWPAP focused on habitat and community modification.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NOWPAP	Supra-LME	1		
Data and information	NOWPAP- DINRAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Yellow Sea LME governance architecture - System summary[ii]					
IW category: LME	**Countries:** China, North Korea, South Korea		**System name:** Yellow Sea LME		**Region:** North West Pacific
Trans-boundary issue[2]	**Number of countries involved**	**Collective importance for countries involved**	**Completeness of governance arrangement % (category)**	**Priority for intervention to improve governance**	**Observations**
Fisheries - EEZs	3		14		No arrangement
Pollution - LBS	3		38		NOWPAP
Pollution - MBS	3		38		
Biodiversity - PAs	3		38		
Biodiversity – habitat and community modification	3		38		
	System architecture completeness index >>		33%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculated[iii].

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)			
Policy cycle stage	**Fisheries – All in EEZs**	**Pollution – LBS and MBS**	**Biodiversity - Pas and habitats**
Policy analysis and advice	PICES	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP-RCU
Policy decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM
Planning analysis and advice	PICES	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP
Planning decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM
Implementation	Countries	Countries	Countries
Review and evaluation	Countries	CEARAC, MERRAC	NOWPAP
Data and information	PICES	DINRAC, MERRAC, CEARAC	NOWPAP- DINRAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrange-ments	**Policy analysis and advice**	**Policy decision-making**	**Planning analysis and advice**	**Planning decision-making**	**Implement ation**	**Review and evaluation**	**Data and informat-ion**	**Overall average**
1 and 2	0	0	0	0	0	0	0	-
1 and 3	0	0	0	0	0	0	0	-
1 and 4	0	0	0	0	0	0	0	-
1 and 5	0	0	0	0	0	0	0	-
2 and 3	1	1	1	1	0	1	1	0.9
2 and 4	1	1	1	1	0	1	1	0.9
2 and 5	1	1	1	1	0	1	1	0.9
3 and 4	1	1	1	1	0	1	1	0.9
3 and 5	1	1	1	1	0	1	1	0.9
4 and 5	1	1	1	1	0	1	1	0.9
Average	0.6	0.6	0.6	0.6	-	0.6	0.6	0.5

Table7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.5 out of a possible 1.

3 Conclusions

The appearance of high integration among arrangements in this LME arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. The Yellow Sea Partnership established by the YSLME Project and intended as a precursor to the YSLME Commission is an arrangement that has the potential to become an integrating agency.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

(i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.

(ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

(iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Yellow Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Yellow Sea LME	Completeness	Integration	Engagement
	33%	0.5	83%

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)
0 = No transboundary science policy mechanism, e.g. COP self advises[iv]
1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
3 = Science-policy interface clearly specified in the agreement[v]

Decision-making (policy and management):
0 = No decision-making mechanism[vi]
1 = Decisions are recommendations to countries
2 = Decisions are binding with the possibility for countries to opt out of complying
3 = Decisions are binding

Implementation:
0 = Countries alone
1 = Countries supported by secretariat
2 = Countries and regional/global level support[vii]
3 = Implemented through a coordinated regional/global mechanism[viii]

Review:
0 = No review mechanism
1 = Countries review and self-report
2 = Agreed review of implementation at regime level
3 = Agreed compliance mechanism with repercussions

Data and information:
0 = No DI mechanism
1 = Countries provide DI which is used as is
2 = DI centrally coordinated, reviewed and shared[ix]
3 = DI centrally managed and shared[x]

End notes

[i]Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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