



TWAP






TRANSBOUNDARY WATERS ASSESSMENT PROGRAMME

Transboundary Waters & Contemporary Risk



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& Assessment Teams*

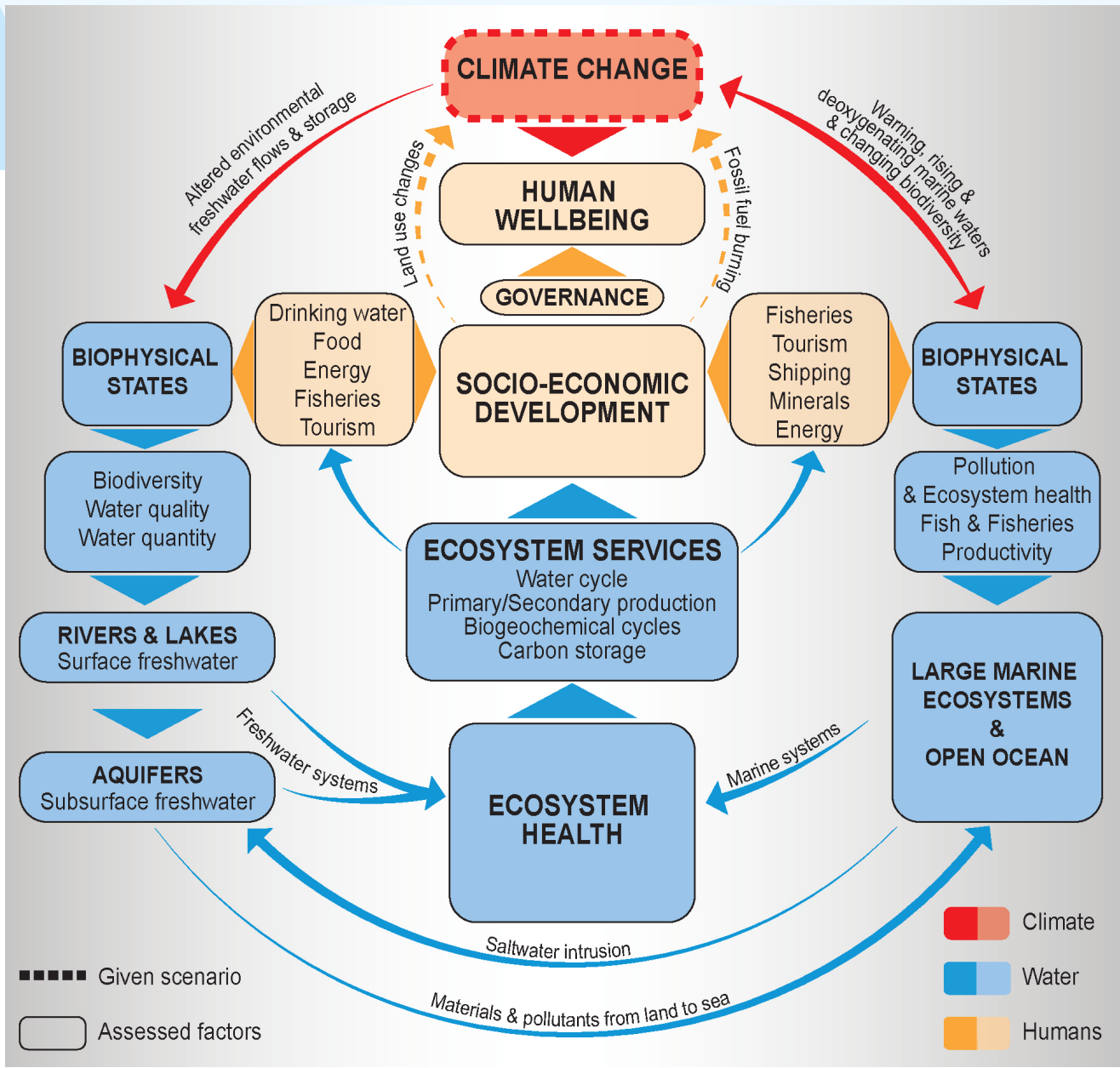


Integrates 5 indicator & water category based global assessments:

-  Volume 1: Aquifers
-  Volume 2: Lake Basins & Reservoirs
-  Volume 3: River Basins
-  Volume 4: Large Marine Ecosystems
-  Volume 5: Open Ocean

Seeks to show regional patterns

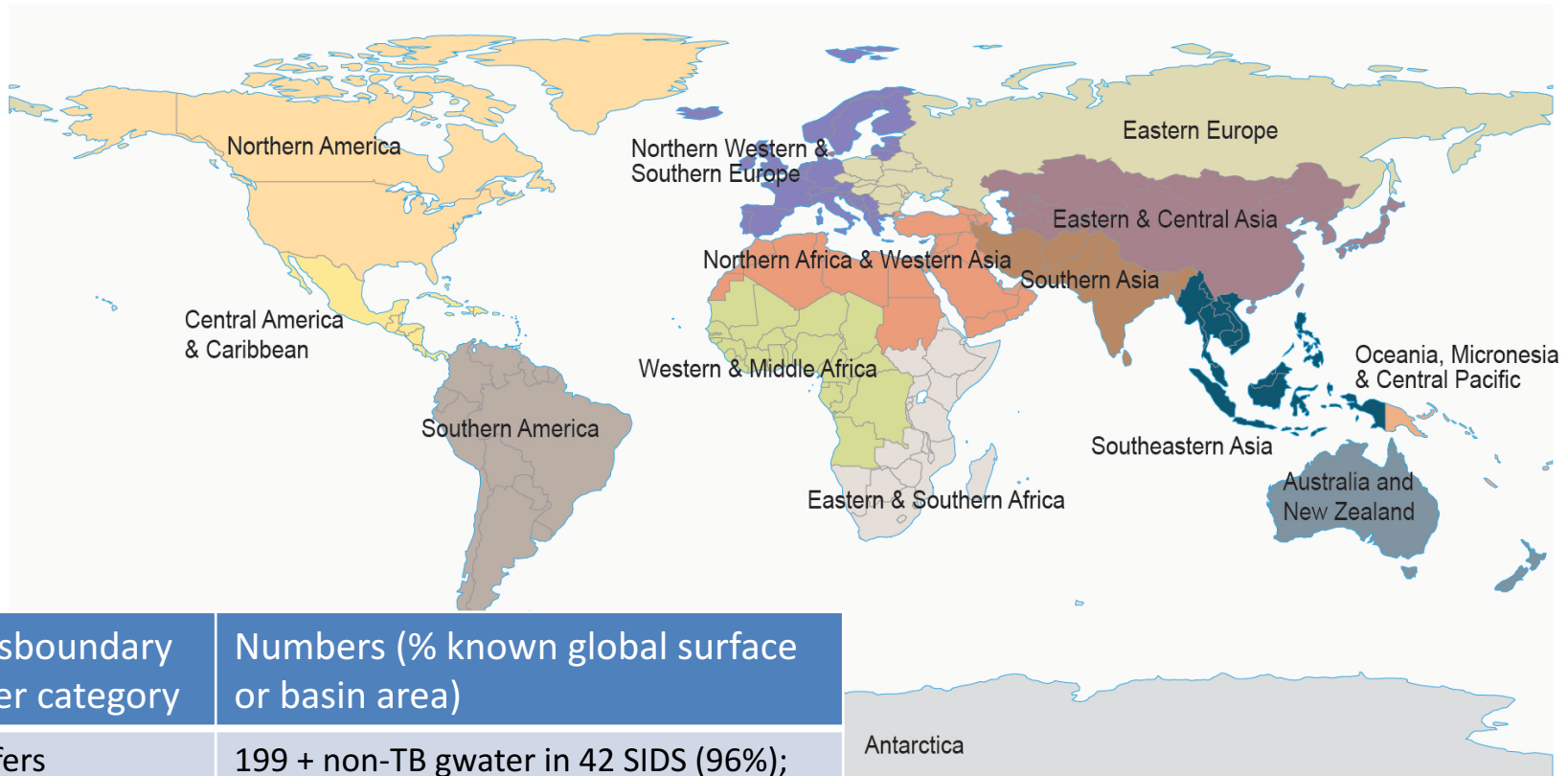
-  showing all five water categories -- aquifers, lake basins, river basins, LMEs, open ocean*
-  by thematic risk -- socioeconomic, governance, biophysical



Conceptual Framework: Crosscutting Analysis

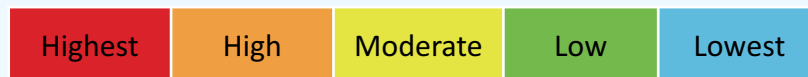
Spatial Coverage of TWAP Assessment (14 regions)


Reference baseline conditions: 2000 - 2010



Transboundary Water category	Numbers (% known global surface or basin area)
Aquifers	199 + non-TB gwater in 42 SIDS (96%); 108 (89%) for crosscutting analysis
Lake basins/ Reservoirs	53 priority lakes (87%) + 151 smaller lakes w/ ancillary data
River basins	286 (100%)
Large Marine Ecosystems	66 (100%)
Open Ocean	1 (100%)

Quantitative Indicators Risk Levels



Directional Indicator =
 Bad (High risk)  Good (Low risk)
 Well-being/ Governance / Ecosystem
 States/ Impacts/ Pressures



Risk = Relative likelihood of failure to sustain ecosystem services from transboundary systems that are essential for human well-being

For each of 14 regions, water systems in each category are assessed:

Indicator Theme	Aquifers	Lake basins	River basins	LMEs	Simple Average Thematic Risk (across 4 categories)	Open Ocean
Socioeconomic	<p>Water system average = across indicators of each theme in each category</p> <p>Regional thematic average = across water systems in the same category weighted by system surface or basin area</p>				Average Socioeconomic Risk	Climate Biodiversity Integrated Indices (e.g. Cumulative Human Impacts Index)
Governance					Average Governance Risk	
Biophysical					Average Biophysical Risk	
Area weighted Average Category Risk	Aquifers at average risk	Lake basins at average risk	River basins at average risk	LMEs at average risk		

Indicators for Assessing Transboundary Waters

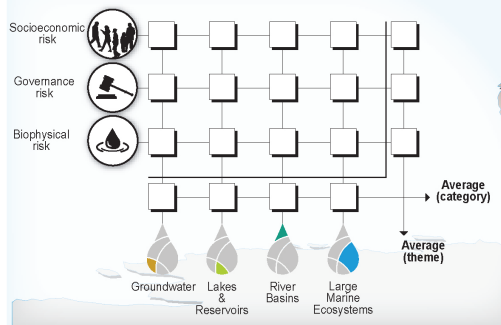
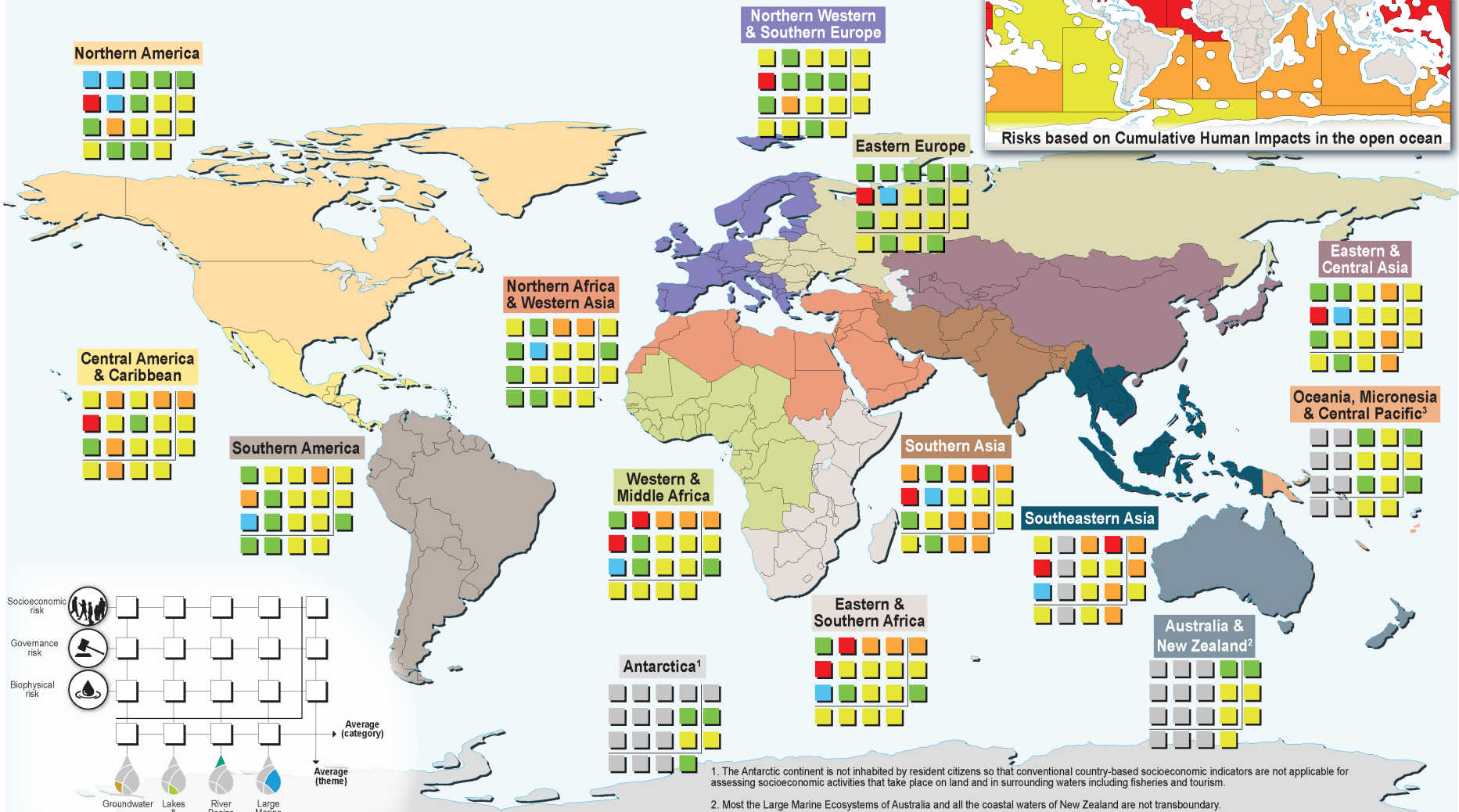
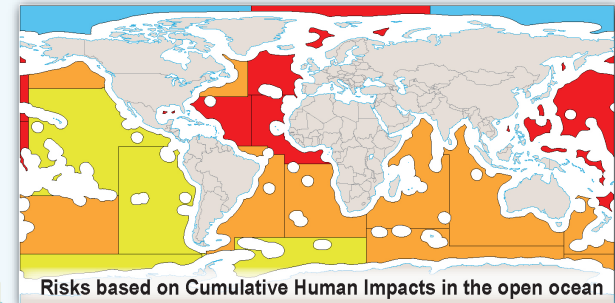
(A Subset of Water Category Indicators)



Water Category (n)	Socioeconomic Indicators	Governance Indicators	Biophysical Indicators
Aquifers (7 indicators) (108 aquifers)	<ul style="list-style-type: none"> 💧 Annual amount of renewable groundwater resource per capita 💧 Human dependency on groundwater 💧 Population density; Total = 3 	<ul style="list-style-type: none"> 💧 Presence of aquifer/associated freshwater system management instruments 	<ul style="list-style-type: none"> 💧 Mean annual groundwater recharge depth w/ & w/o irrigation recharge 💧 Groundwater depletion 💧 Groundwater development stress Total = 3
Lake basins (4 indicators + 23 catchment drivers) (53 priority basins)	<ul style="list-style-type: none"> 💧 Human Development Index (HDI) (4 metrics) 	<ul style="list-style-type: none"> 💧 Presence of lake basin/associated river basin management instruments 	<ul style="list-style-type: none"> 💧 Human water security (using catchment drivers) 💧 Biodiversity security (using catchment drivers)
River basins (14 indicators) (286 basins)	<ul style="list-style-type: none"> 💧 Economic dependency on water resources 💧 Societal wellbeing 💧 Exposure to floods & droughts; Total = 3	<ul style="list-style-type: none"> 💧 Legal framework 💧 Hydro-political tension 💧 Enabling environment Total = 3	<ul style="list-style-type: none"> 💧 Environmental water stress 💧 Human water stress 💧 Agricultural water stress 💧 Nutrient pollution 💧 Waste water pollution 💧 Ecosystem impacts from dams 💧 Threat to fish 💧 Extinction risk; Total = 8
Large Marine Ecosystems (23 indicators) (66 LMEs)	<ul style="list-style-type: none"> 💧 Coastal population size 💧 Number of coastal poor 💧 HDI (4 metrics) 💧 Present day Climate Threat Index (4 indicators) Total = 6	<ul style="list-style-type: none"> Governance architecture 💧 Completeness 💧 Integration 💧 Engagement Total = 3	<ul style="list-style-type: none"> 💧 SST change, 💧 Ecological footprint 💧 Change in Marine Trophic Index 💧 Change in catch potential 2050 💧 Plastics Micro nos/km²; 💧 Macro gm/km²) 💧 POPs-PCBs 💧 POPs-DDTs 💧 POPs-HCHs 💧 DIN 💧 Coastal Eutrophication 💧 Nutrients merged 💧 Reefs at Risk 💧 Change in MPA coverage; Total = 14
Open Ocean (12 indicators) (19 FAO regions)	<ul style="list-style-type: none"> 💧 Cumulative Human Impacts Index (Indicators for Climate Change (5), Industry (2), and Commercial Fishing (5)); Total = 12		

REGIONAL RISKS BY TRANSBOUNDARY WATER SYSTEM CATEGORY AND BY THEME

Risk levels
 Very low ■ Low ■ Moderate ■ High ■ Very high ■ Not applicable ■

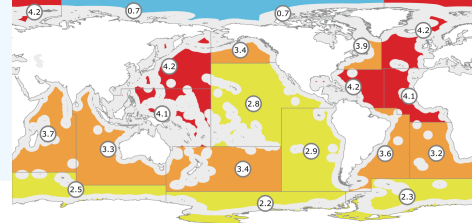


1. The Antarctic continent is not inhabited by resident citizens so that conventional country-based socioeconomic indicators are not applicable for assessing socioeconomic activities that take place on land and in surrounding waters including fisheries and tourism.

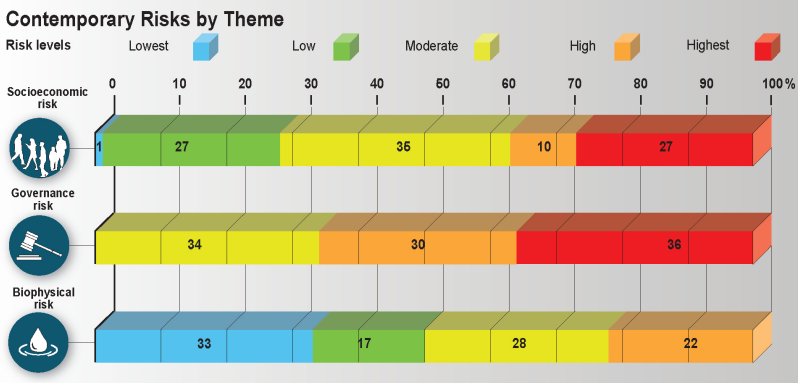
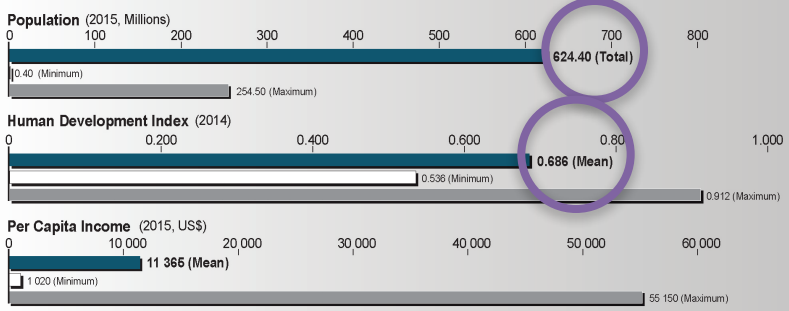
2. Most of the Large Marine Ecosystems of Australia and all the coastal waters of New Zealand are not transboundary.

3. Included in the assessment of Oceania, Micronesia and Central Pacific are the countries within the Pacific Warm Pool.

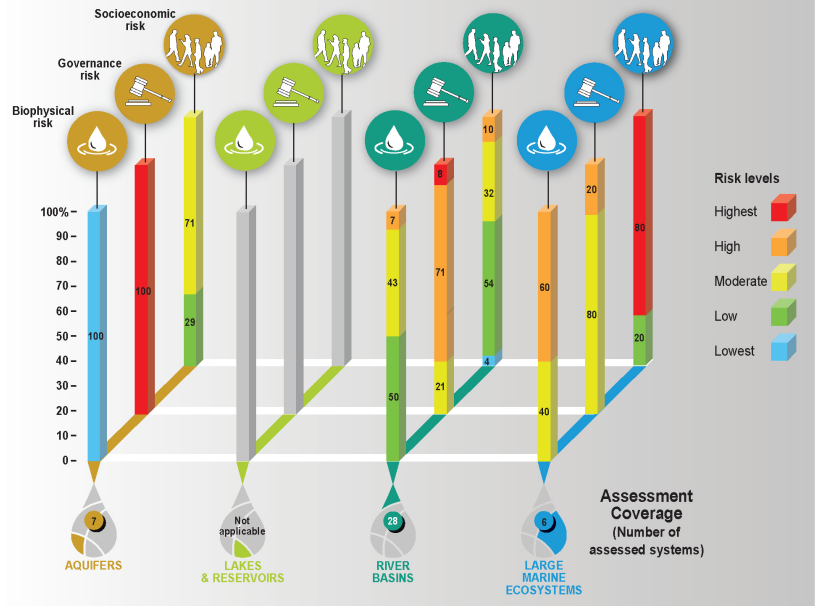
Most at risk region using themes + highest risk from Open Ocean



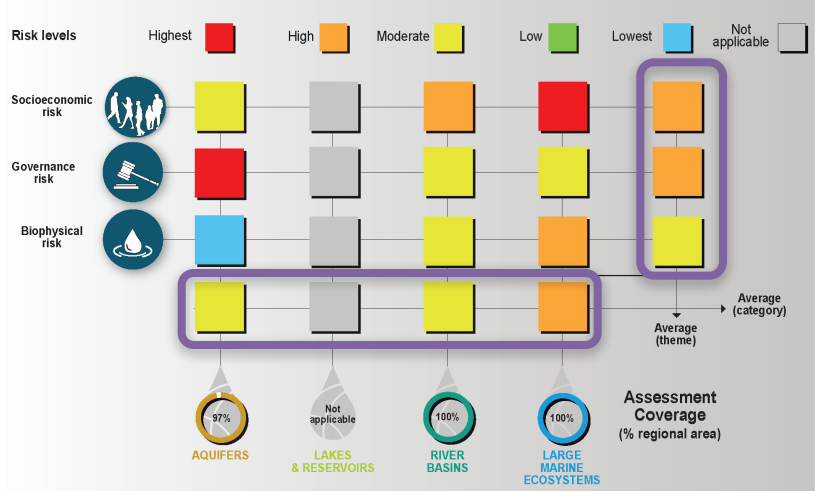
TRANSBOUNDARY WATERS: SOUTHEASTERN ASIA



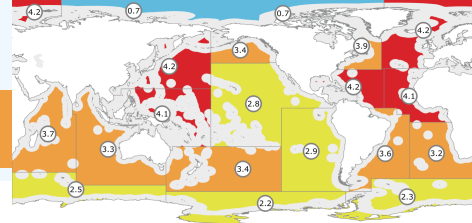
Contemporary Risks by Water Category



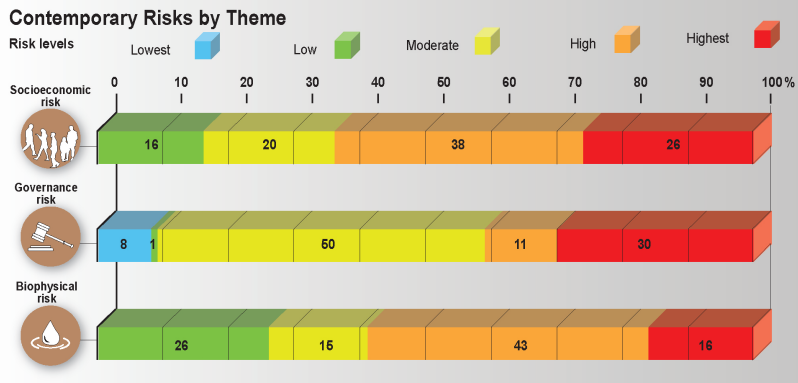
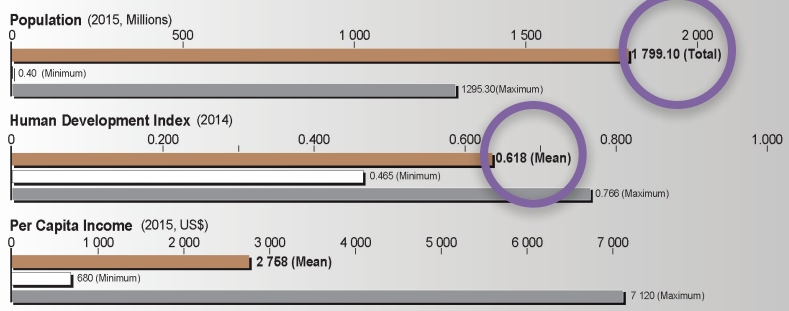
Average Risks



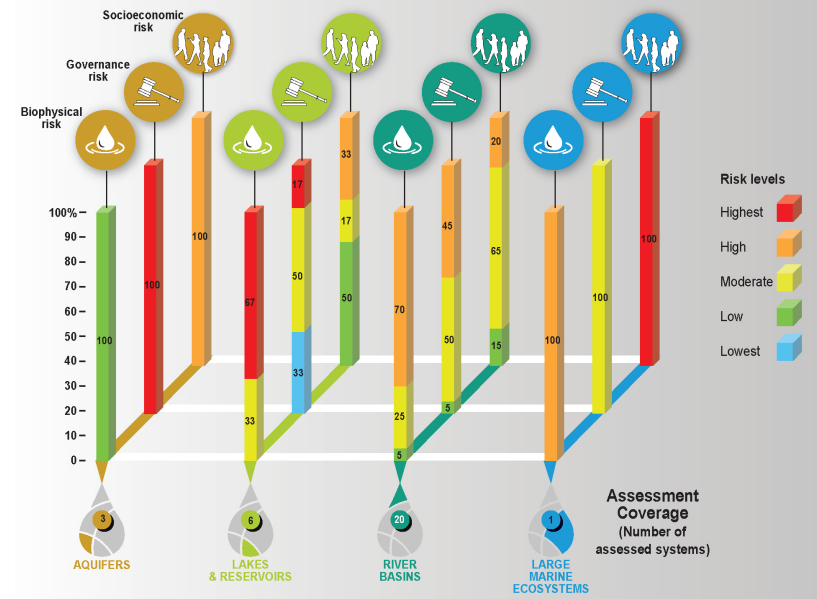
Most at risk region using water categories + high risk from Open Ocean



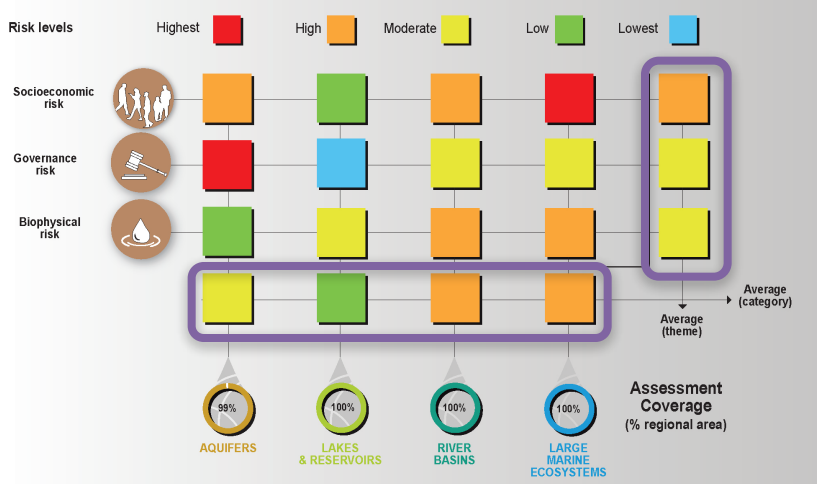
TRANSBOUNDARY WATERS: SOUTHERN ASIA



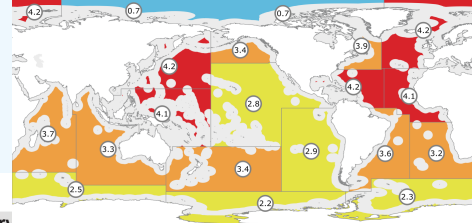
Contemporary Risks by Water Category



Average Risks

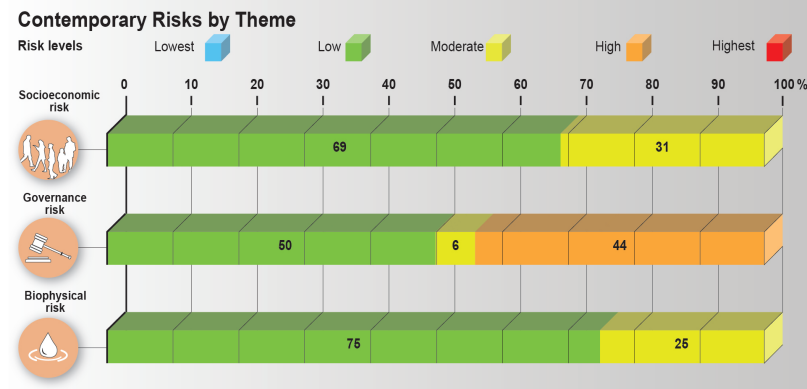
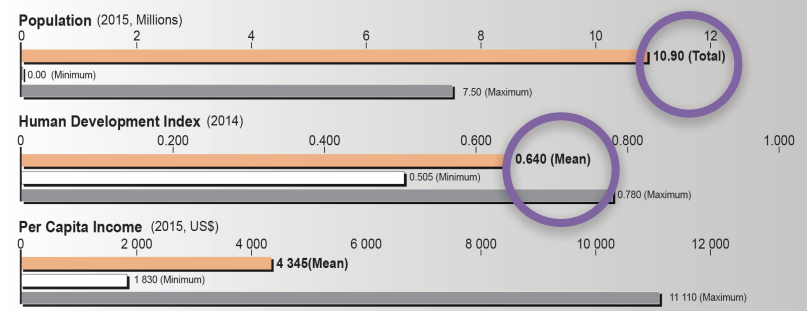


A region at low risk but at highest risk from open ocean

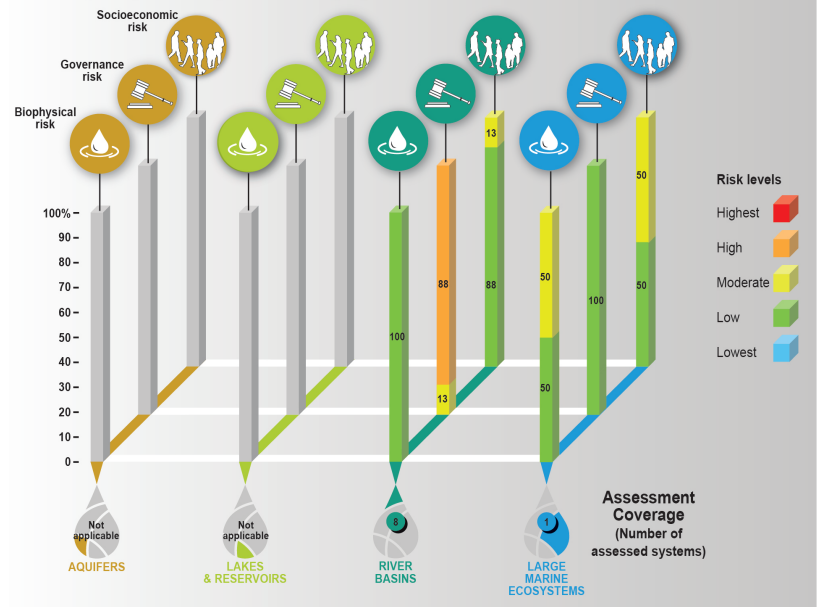


TRANSBOUNDARY WATERS: OCEANIA, MICRONESIA & CENTRAL PACIFIC

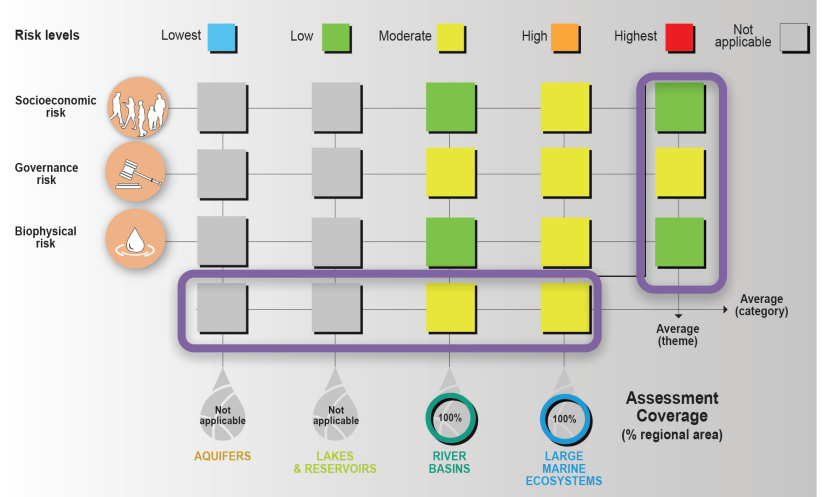
The region is classified as Medium HDI with a regional average HDI of 0.640 and a population of 11 million in 2015. Contemporary risks of water systems by water category and theme expressed as percentages are shown at top right. Across nine transboundary waters and the Western Pacific Warm Pool (WPWP) area (bottom left), 69% experience low socioeconomic risk, 50% are at moderate to high governance risk while the other 50% are at low governance risk, and 75% are at low biophysical risk. On average (bottom right), transboundary waters are at low socioeconomic and biophysical risk, but are at moderate governance risks. Both river basins and LME and the WPWP are at moderate risk averaging across all risk themes.



Contemporary Risks by Water Category



Average Risks



Summary and Conclusions

- 💧 Regions at moderate and above risk :
 - address integrated socioeconomic, governance, biophysical dimensions of risk to lower risk in a warming climate
- 💧 Regions at low risk:
 - Maintain in a warming climate
- 💧 Data needs
 - Augment spatial coverage for aquifers & lake basins
 - Increase long-term time series and spatial data for all water categories at sub-system scale



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Thank you!



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