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TRANSBOUNDARY WATERS ASSESSMENT PROGRAMME

The Open Ocean: Status and Trends

Albert Fischer, IOC/UNESCO





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UNEP-DHI PARTNERSHIP
Centre on Water and Environment

UNEP DHI

United Nations Educational, Scientific and Cultural Organization

International Hydrological Programme

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

ILEC

The Open Ocean

The planet's largest transboundary space

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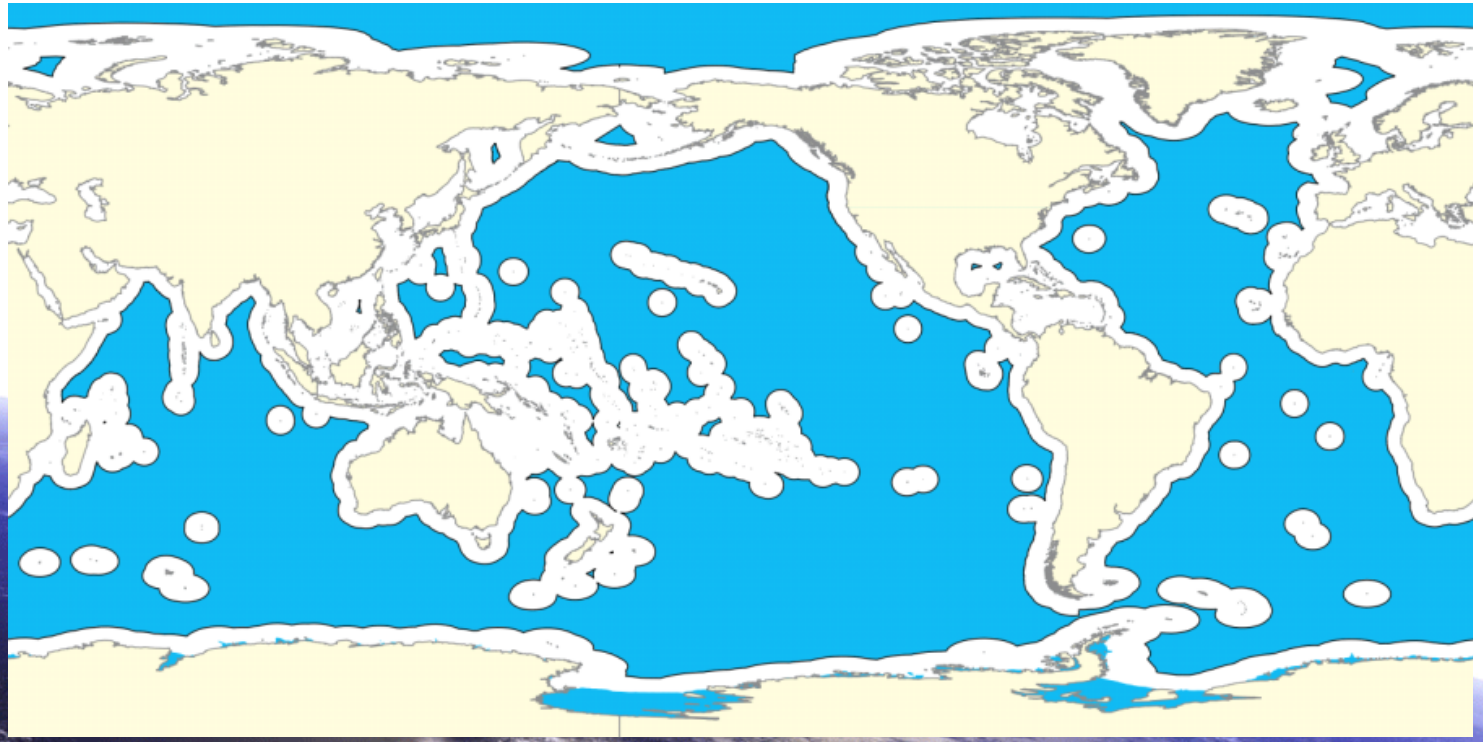


Assessment approach

Global ocean – local vulnerability

- Focus on themes where a **global commons / global environmental issues** related to the oceans exist
- Through indicators/mapping, **identify local impact to ecosystem vulnerability or human vulnerability**, with **future projections** where possible
- Assess the relevant thematic **governance architecture**: pointing to where action is needed
- **Scientific assessment** of peer-reviewed literature
  - Necessary for long-timescale, high-uncertainty, potentially high-impact environmental problems



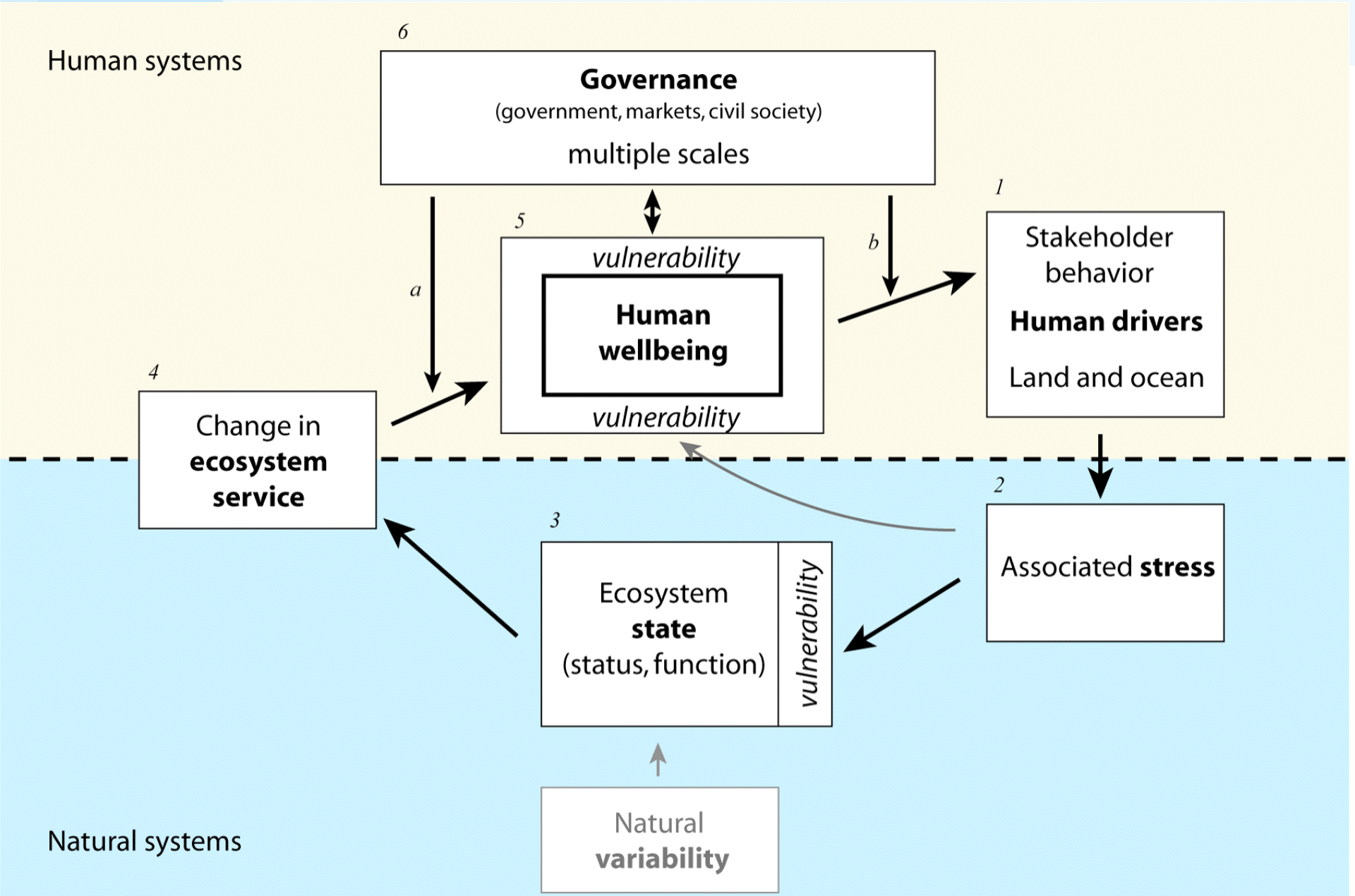

Assessment approach

Global ocean – local vulnerability

- **Climate** change, variability and impacts
- **Ecosystems**, habitats and biodiversity
- **Fisheries**, impact and sustainability
- **Pollution** and contaminants
- **Integrated assessment**
- **Governance**

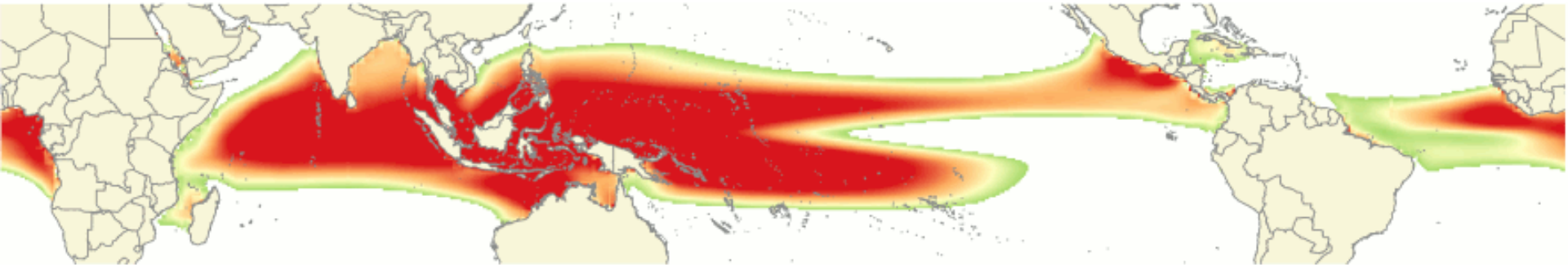



LMES & OPEN OCEAN CONCEPTUAL FRAMEWORK



Open ocean climate

Warming



Warm pool extent, RCP 8.5 ‘business as usual’ scenario, present to 2060

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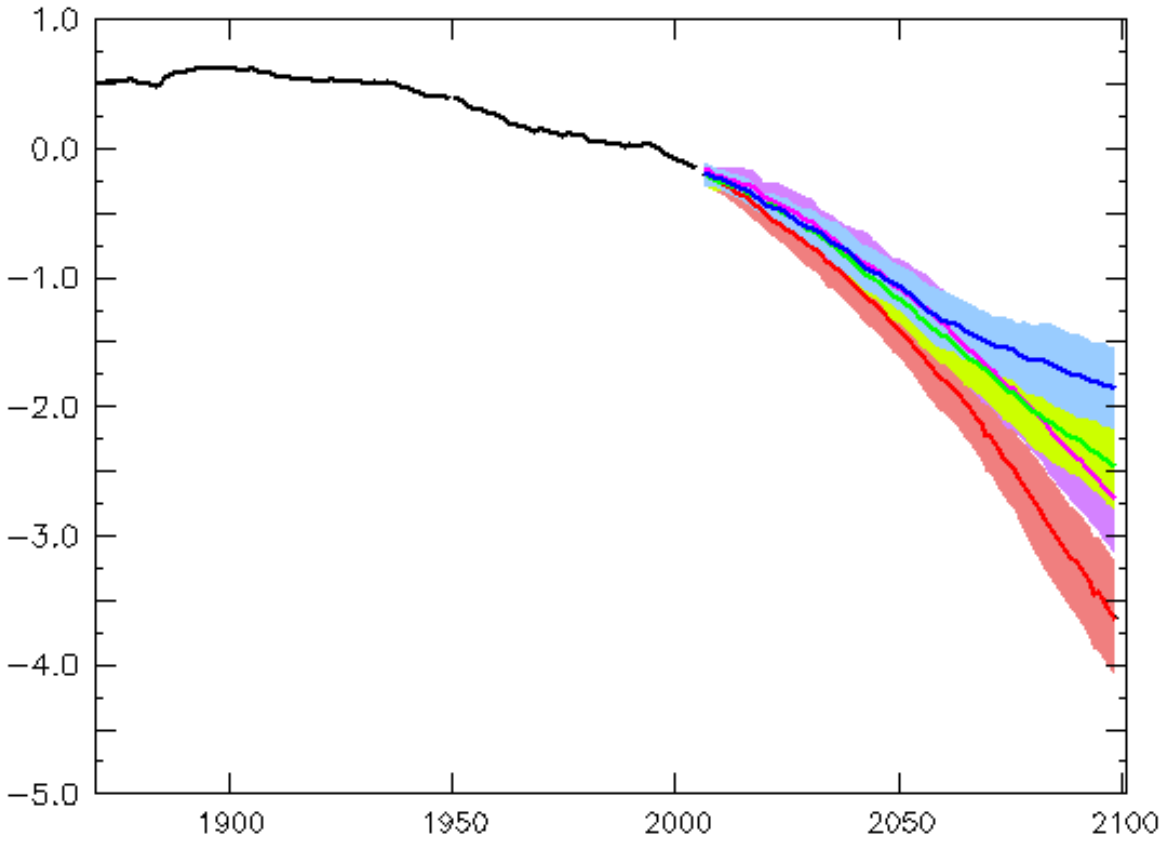
Open ocean climate

Oxygen is decreasing



Projected decrease in oxygen under different emissions scenarios

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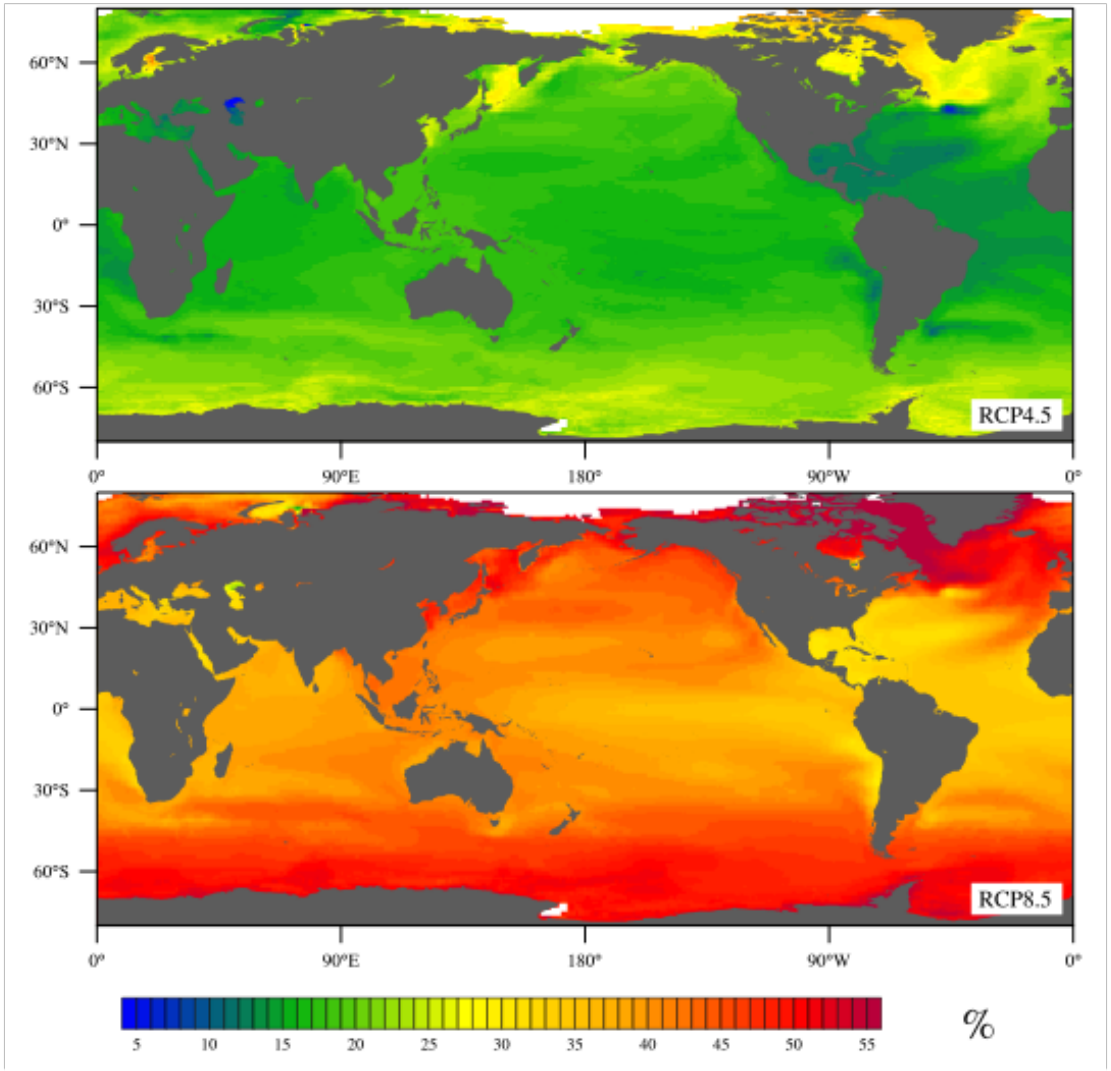
Open ocean climate
Acidifying



Acidification in 2100
under moderate mitigation

And business as usual

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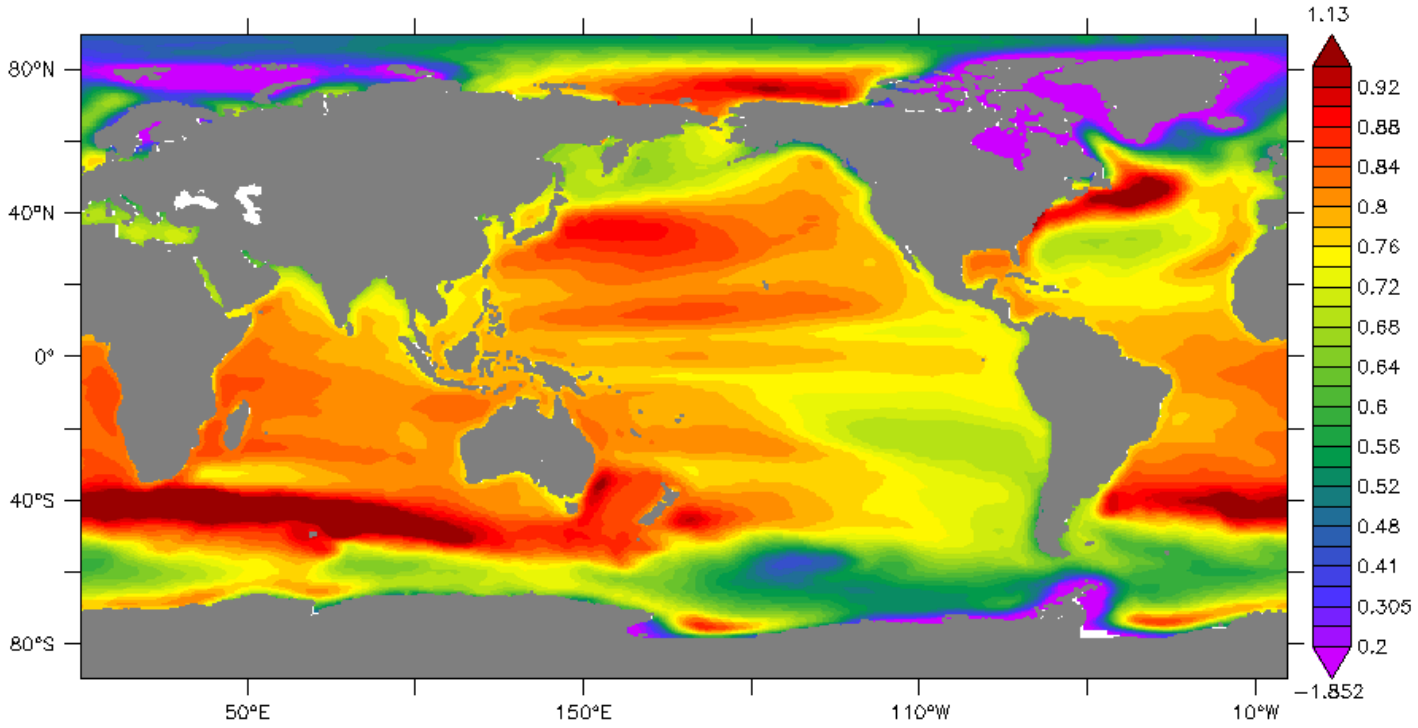
Open ocean climate

Sea level is rising



2100, business as usual scenario

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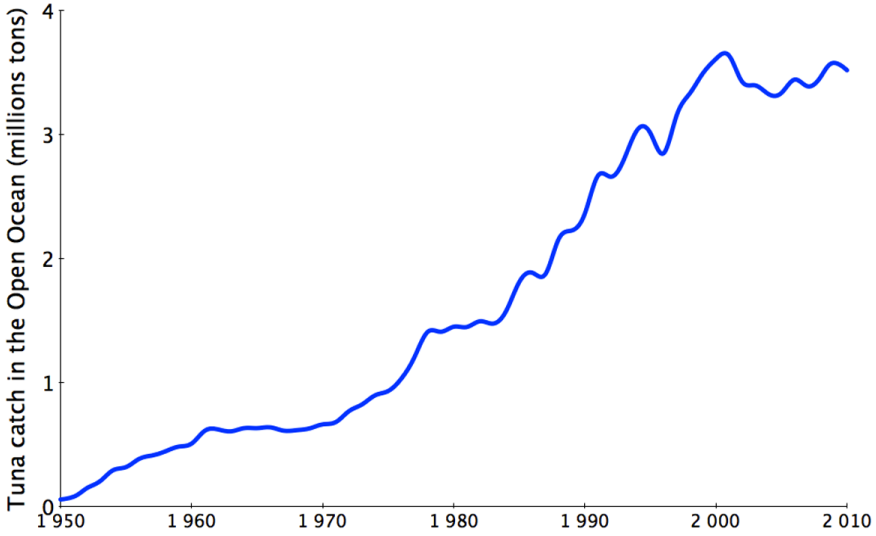
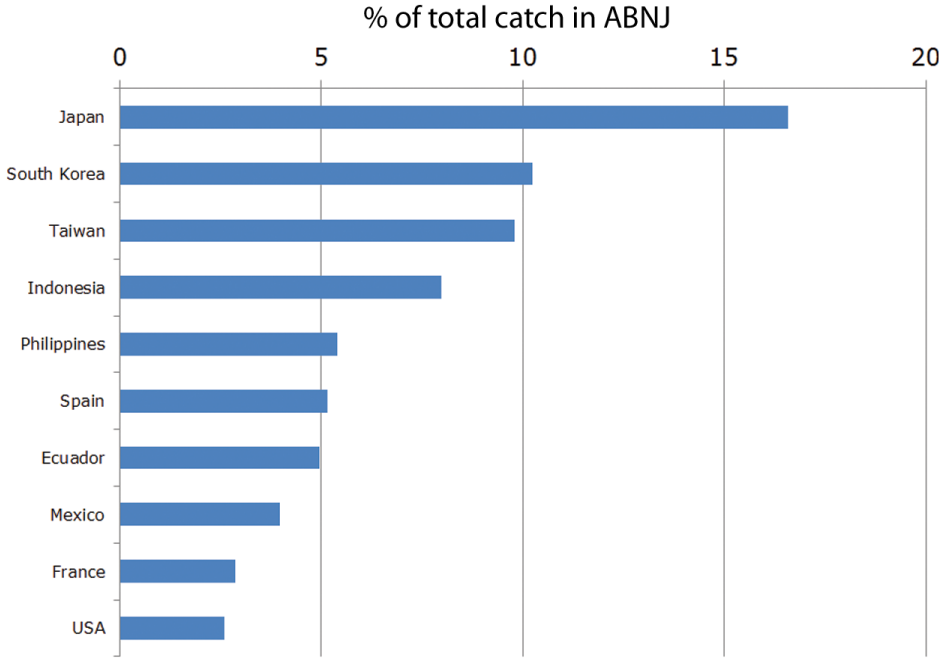
Fisheries

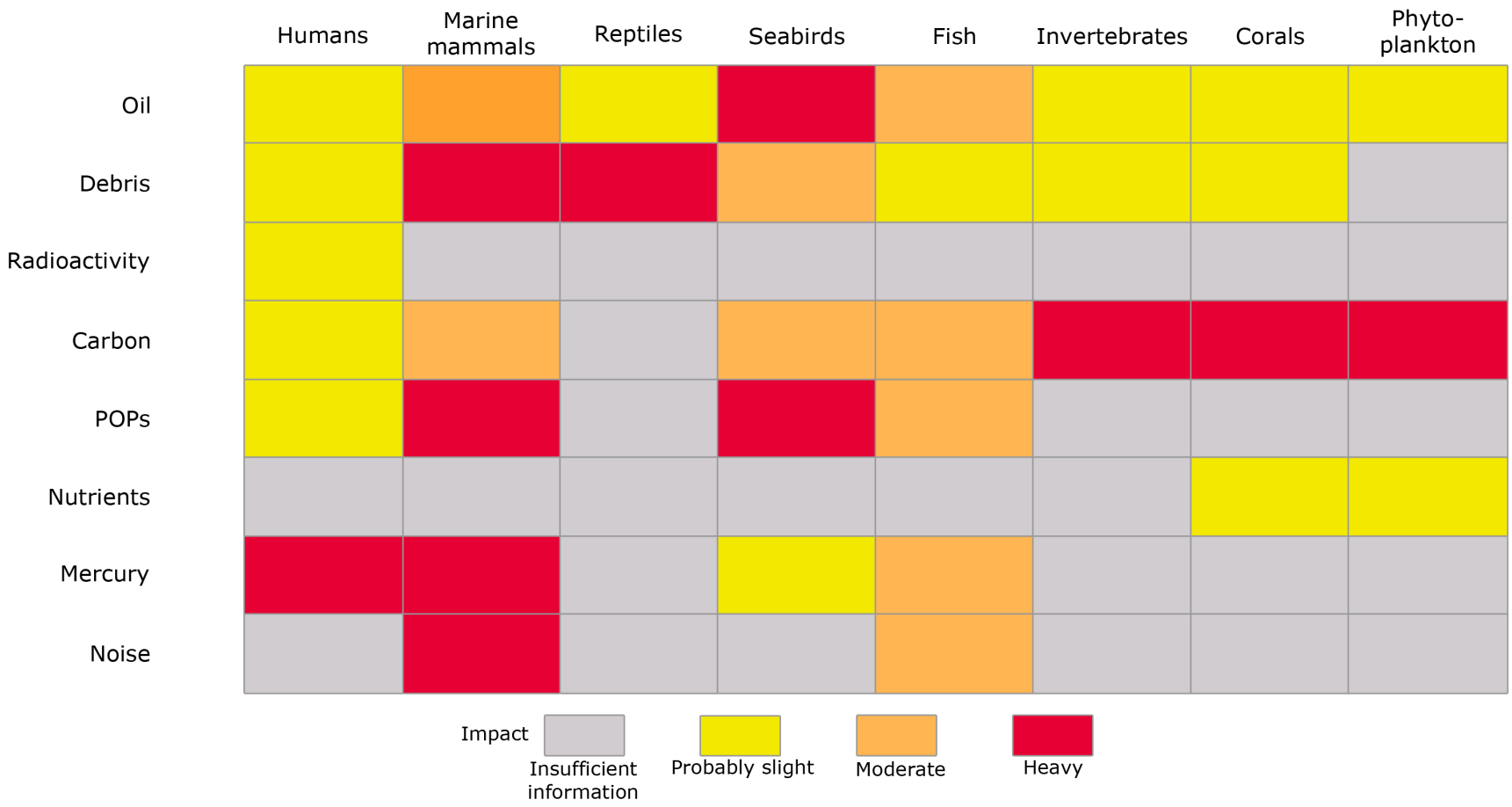
Direct human impact is growing



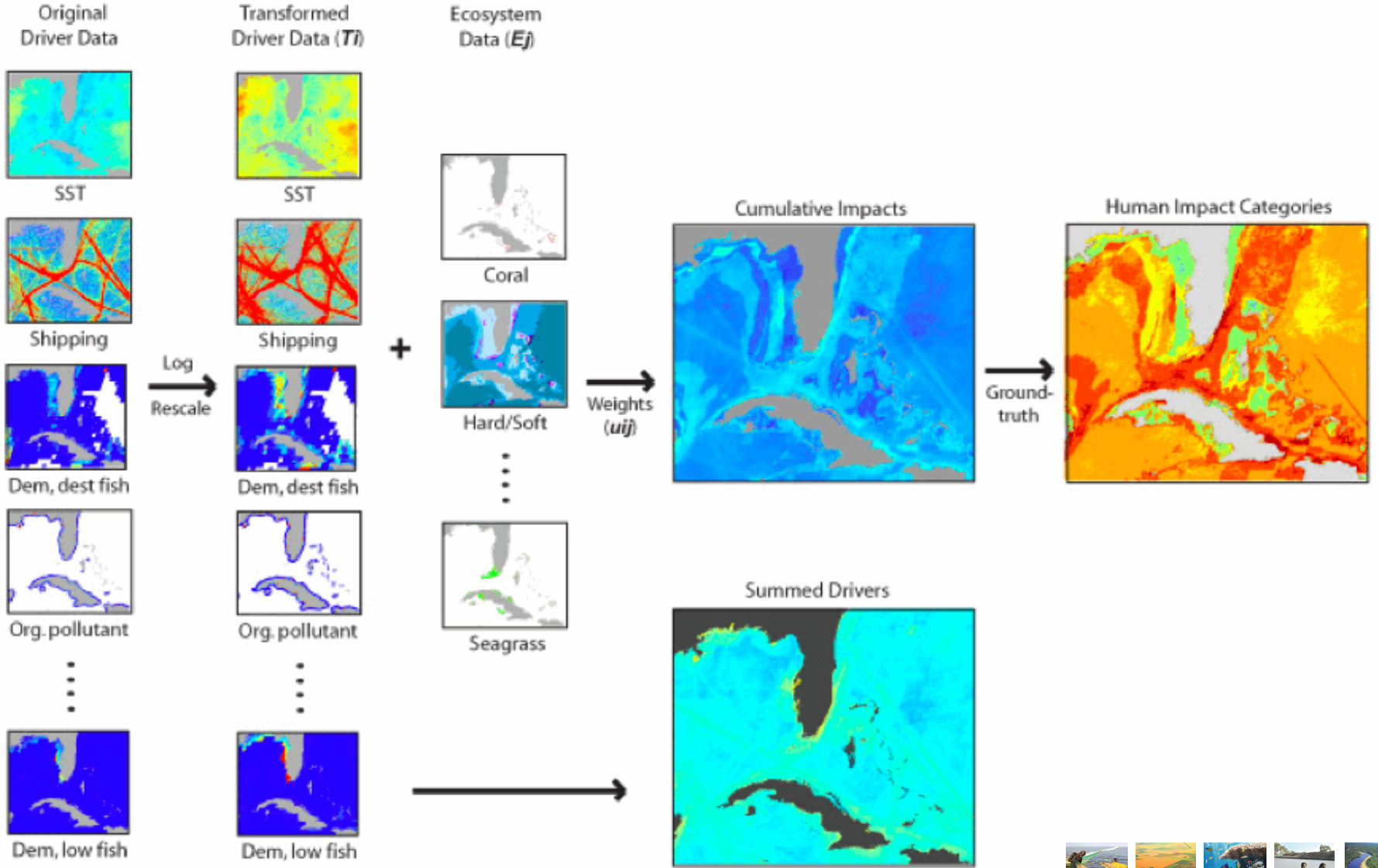


Pollution

Poses threats to open ocean ecosystems

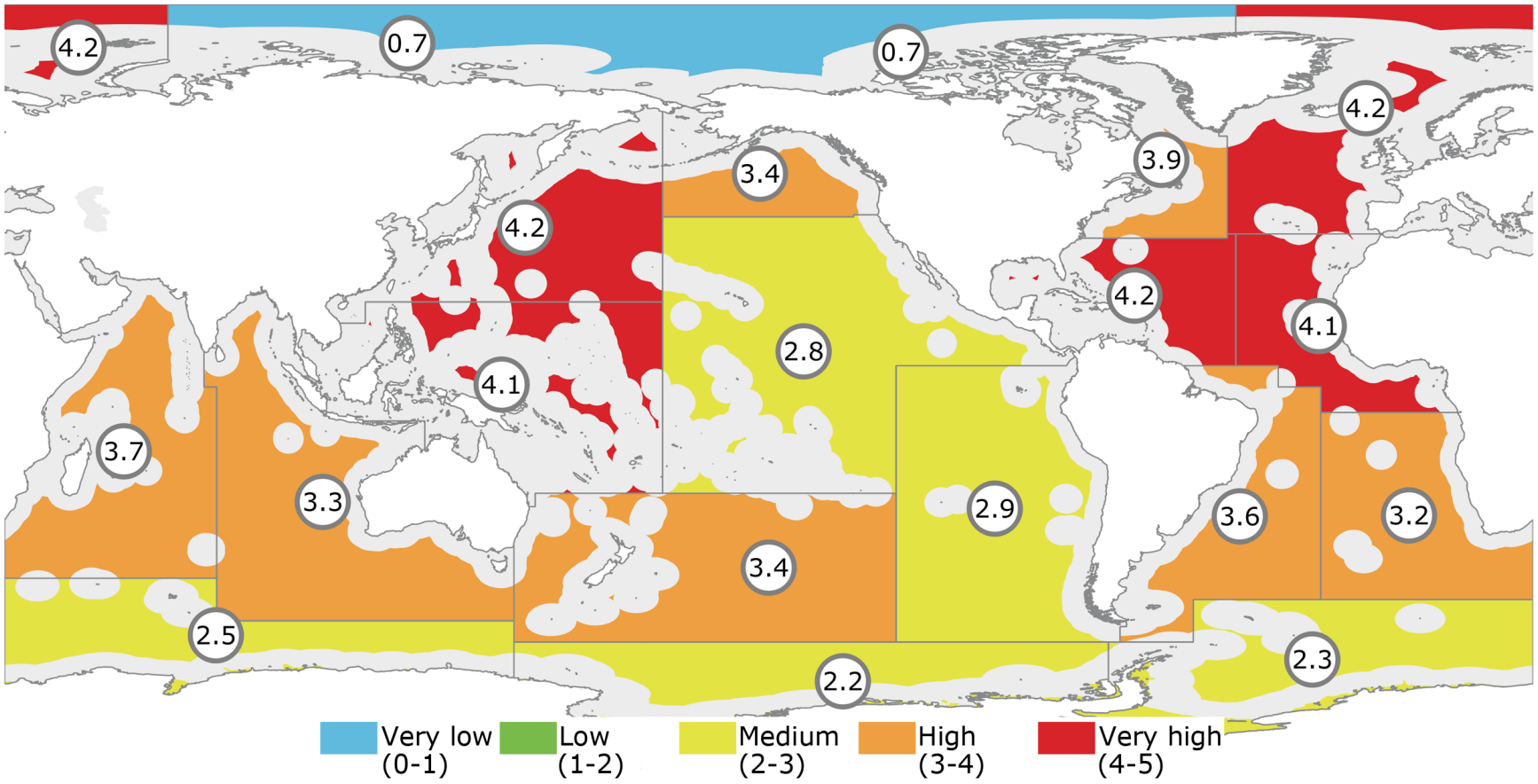


Cumulative human impact

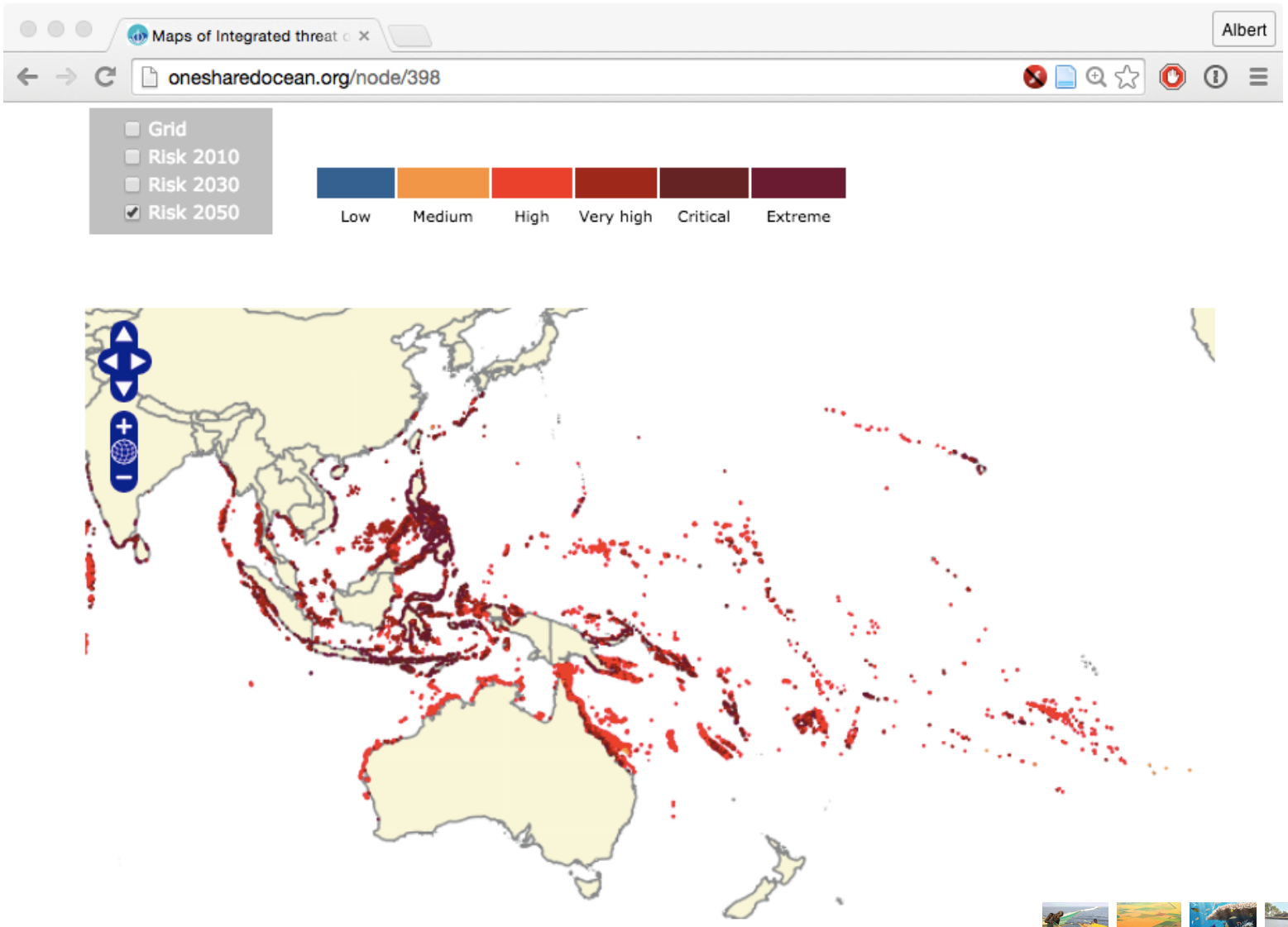


Cumulative human impact

Strong in many open ocean areas



Corals
Reefs at risk



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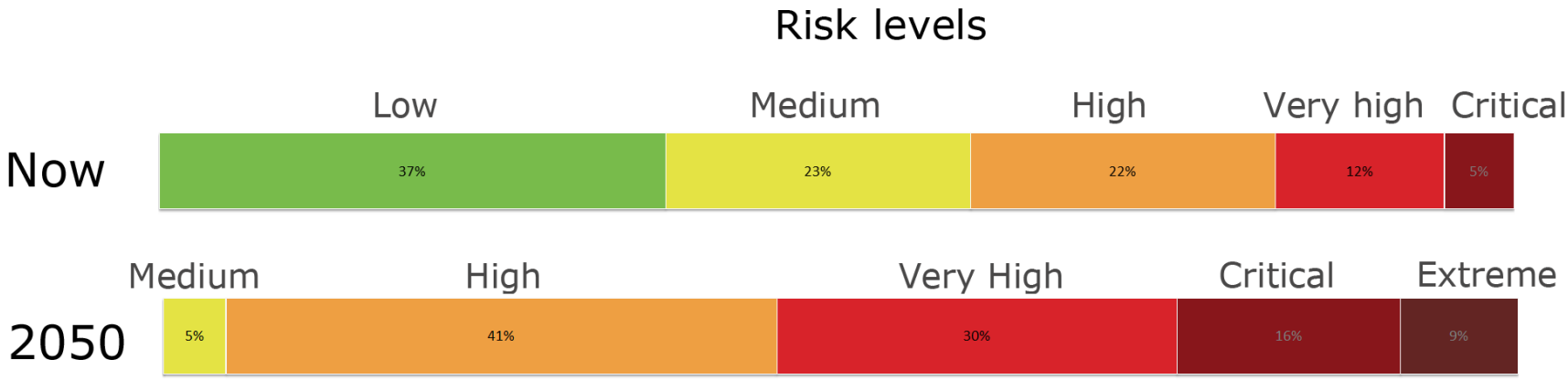
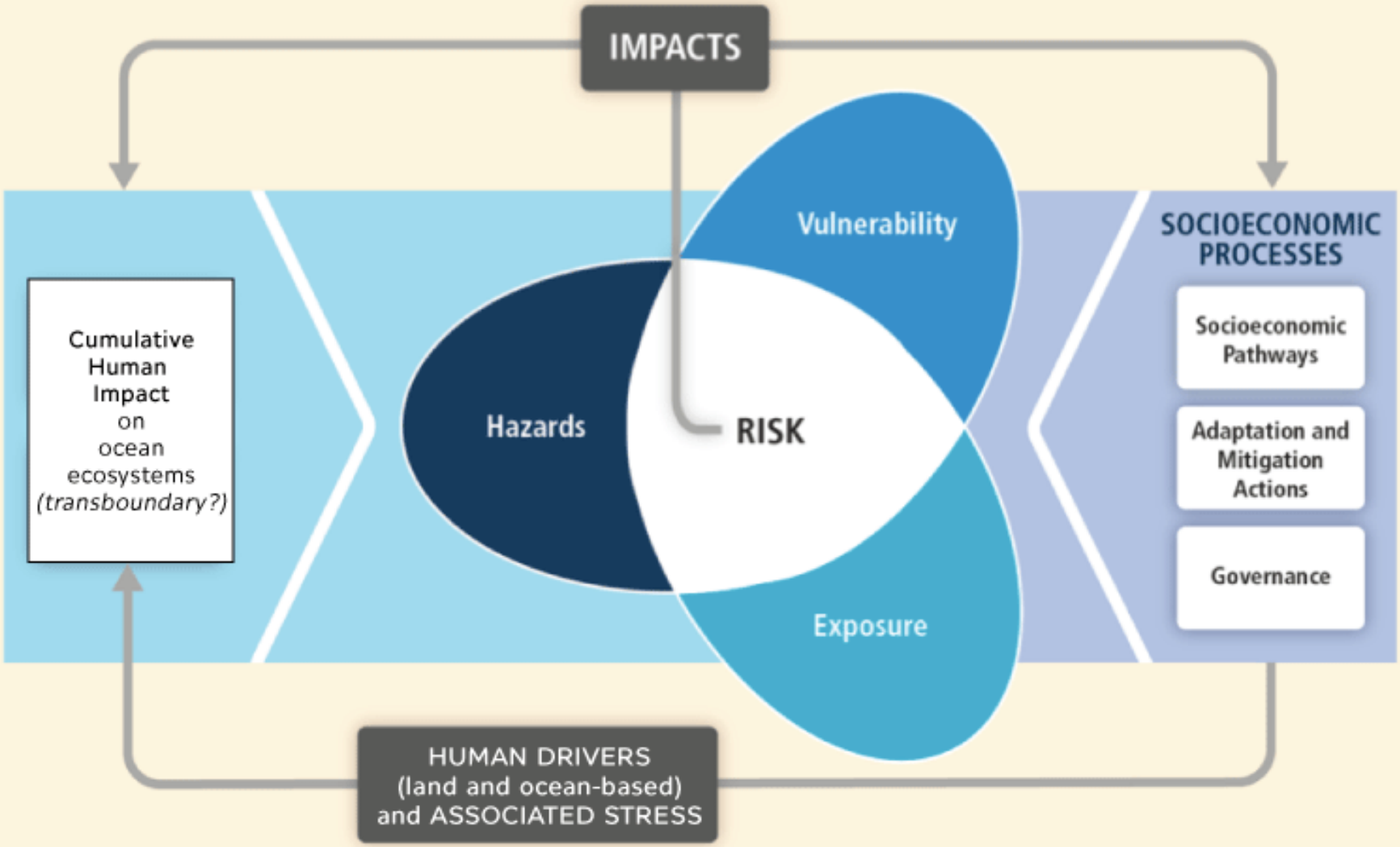
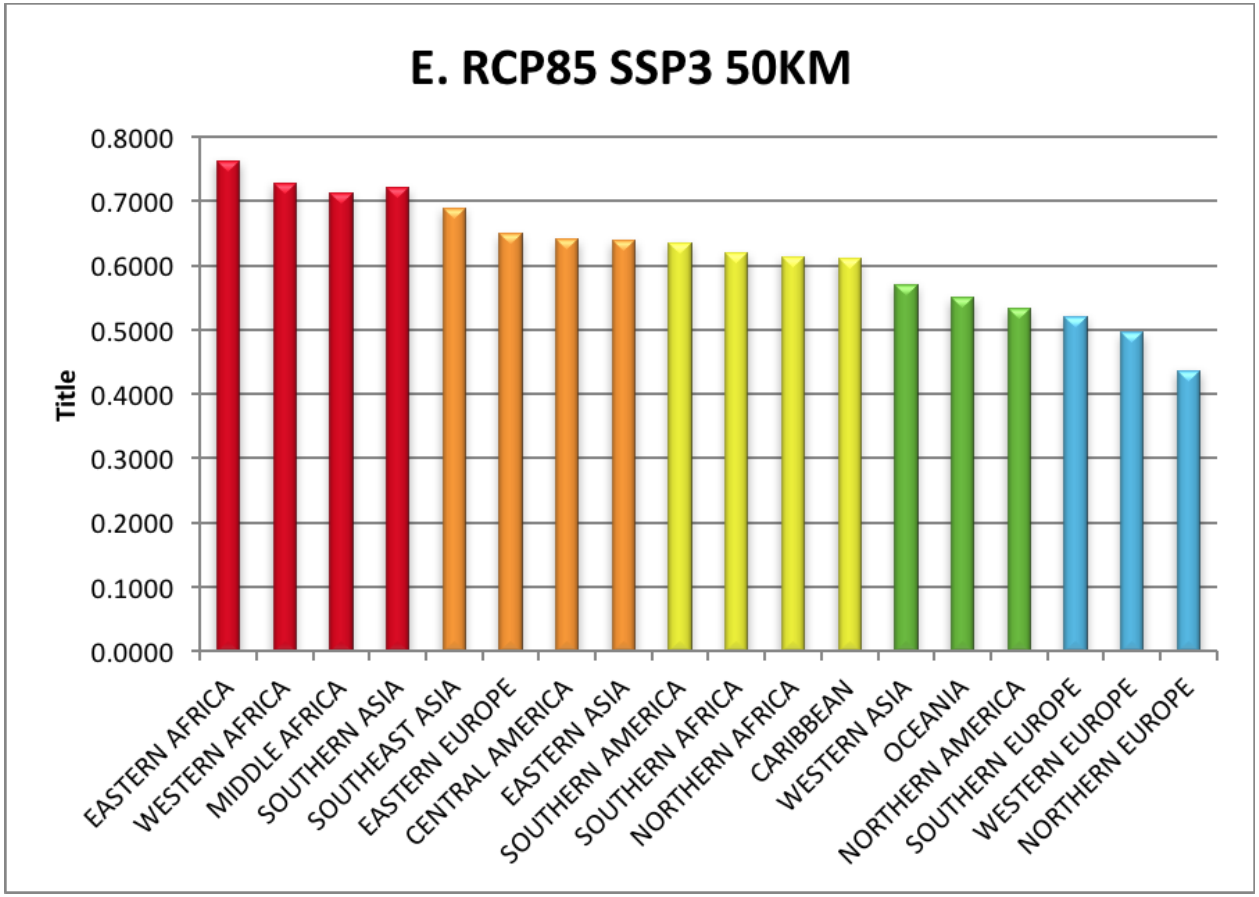


Risk In the context of TWAP



Global sea level rise

Risk: hazard, vulnerability, exposure

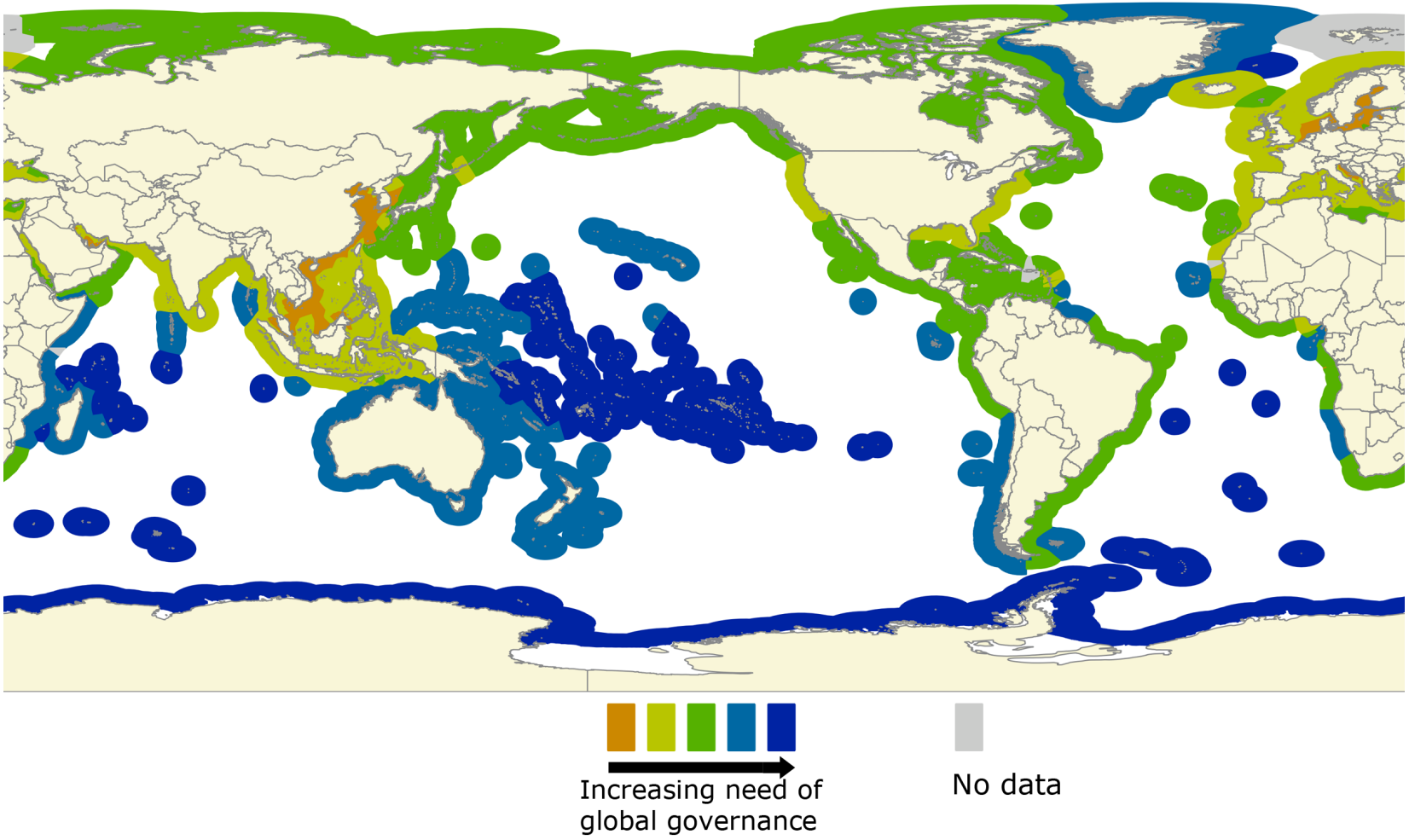


SLR Risk Index

- Very high risk
- High risk
- Moderate risk
- Low risk
- Very low risk

Local risk, global issues

Risk from transboundary environmental issues



Risk

- From a national perspective:
  - Hazard related to human drivers of ocean ecosystem impact can be mitigated through national/regional/global frameworks -> **a small number of countries have primarily national issues**
  - **Global climate/acidification** drivers of ecosystem impact **dominate in most countries**, and are **expected to grow**
  - Certain areas have particularly high relative impact from **global issues**:
    - Pacific SIDS, Indian Ocean SIDS,
  - Highest risk areas
    - Driven by high vulnerability/exposure
    - Most have high level of national/regional issues with ocean ecosystem degradation
    - Global climate/acidification drivers will grow in time
  - Mitigation requires strong global frameworks, adaptation is an imperative

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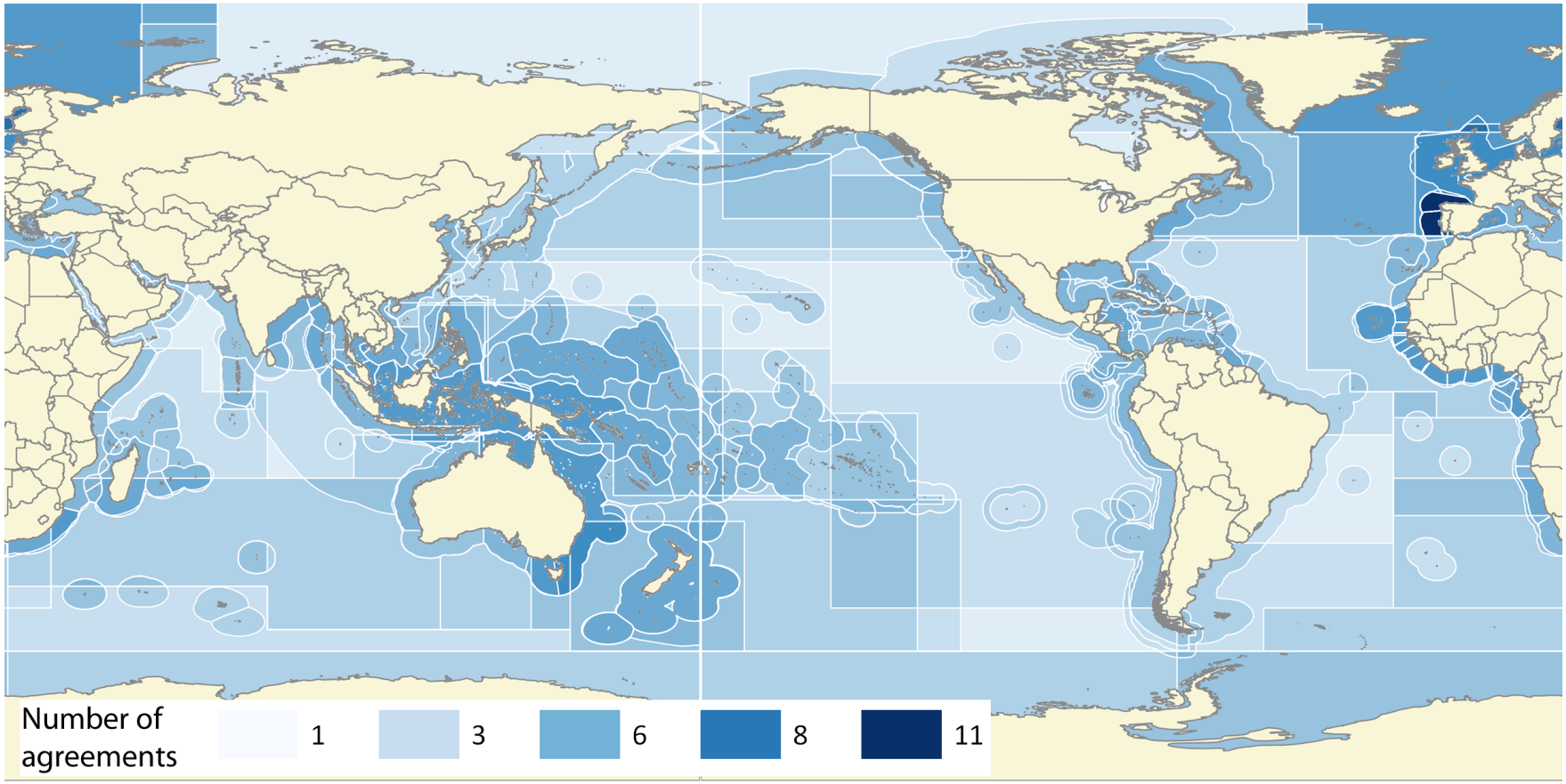
Governance

Regional clusters a core for integration



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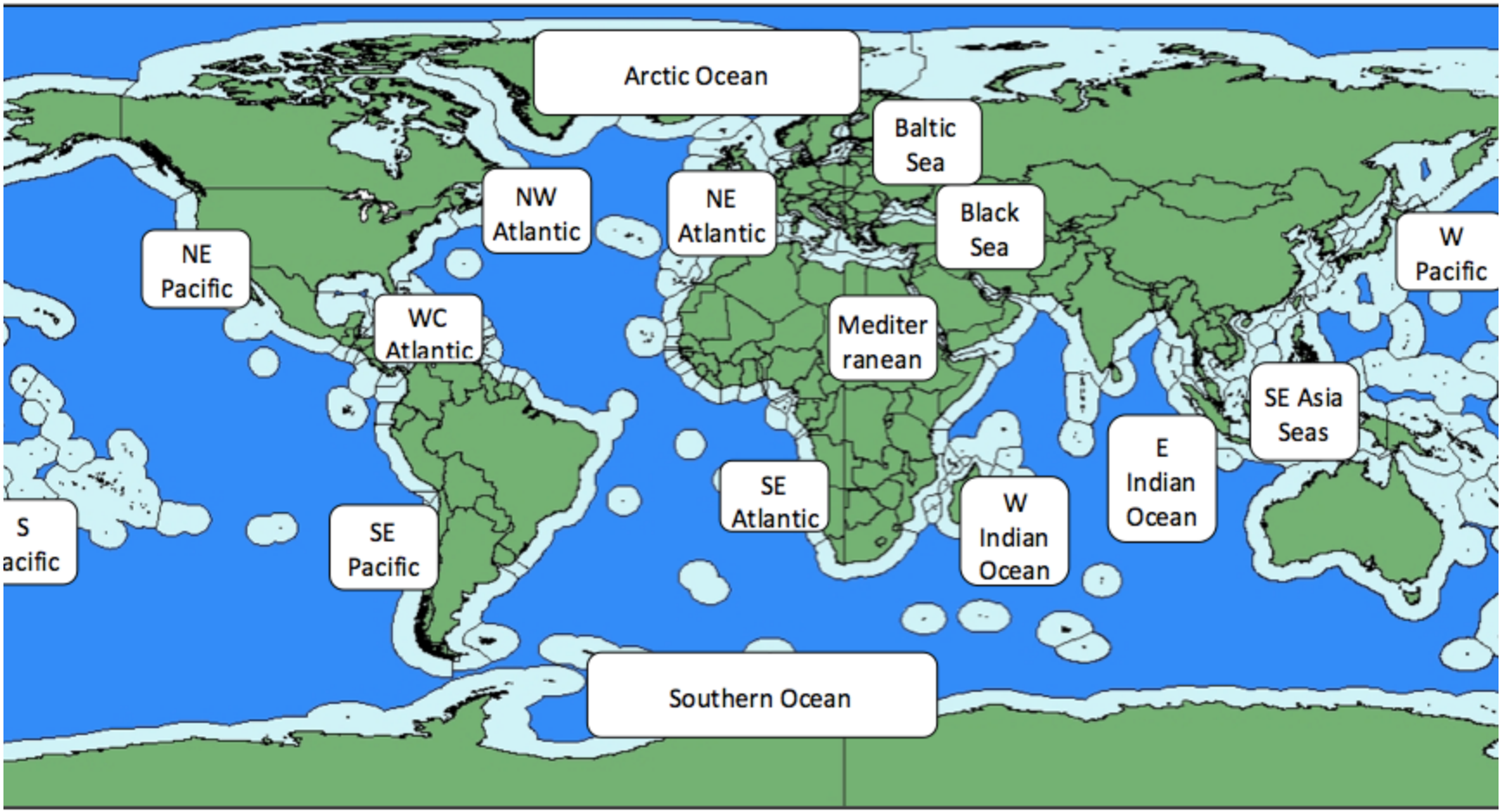

Open ocean
Indicators and readiness to observe

The Global Ocean Observing System

THEME	Expert Assessment	INDEX / INDICATOR (Baseline)	INDEX / INDICATOR (Projected to 2030, 2050, and/or 2100)	Sustained monitoring requirement for assessment *includes both natural system and human data*	Readiness of sustained observations *(concept, pilot, mature, from least to most ready)*
Governance	Existence of Open Ocean Governance Arrangements			Monitoring of governance arrangements covering ABNJ	concept
Climate	Climate and Ocean interactions	Ocean warming	Ocean warming	Physical / biogeochemical ocean variables	mature / pilot
		Deoxygenation	Deoxygenation (to 2090)	Oxygen	pilot
		Aragonite saturation state	Aragonite saturation state	Carbonate system	mature
			Sea Level Rise Risk Index (to 2100)	Sea level, temperature, cryosphere	mature / pilot
				human exposure and vulnerability to sea level	mature
Ecosystems, habitats and biodiversity	Ocean Acidification Risk	Primary productivity		ocean colour in situ validation	mature pilot
		Phytoplankton		phytoplankton	concept
		Zooplankton		zooplankton	pilot
		Coral reefs (tropical ecosystem)	Coral reefs (tropical ecosystem)	coral health	pilot
		Pteropods (polar ecosystem)	Pteropods (polar ecosystem)	zooplankton	pilot
		Biodiversity (based on OBIS records)		Biodiversity (species records)	concept

Open ocean
Indicators and readiness to observe

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Fisheries	Sustainability of fisheries	Marine Trophic Index	Fish Catch Potential	fish catch data by taxonomic group and trophic level	mature
		Fishing in Balance Index		fish catch data by taxonomic group and trophic level over time	mature
		Bottom Impacting Gear		method of fish catch	mature
		Demersal Fishing		method of fish catch	mature
		Tuna trends 1950 to 2010		fish catch data	mature
Pollution	Pollution (general)	Plastics		time series of ocean contaminants from strategically selected sites	concept

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Open ocean:
regional and local impact

- Global transboundary issues involving the open ocean already have and will have increasing impact locally
- Our ability to monitor human impacts on the open ocean is limited but growing
- Transboundary global and regional scale governance solutions are needed to mitigate even local damage to ocean ecosystems - enhancing governance around regional clusters that cover territorial areas and ABNJ may be a solution
- Scientific monitoring and assessment processes can and should insert themselves in policy cycles: monitoring SDG progress, improved UNGA World Ocean Assessment

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