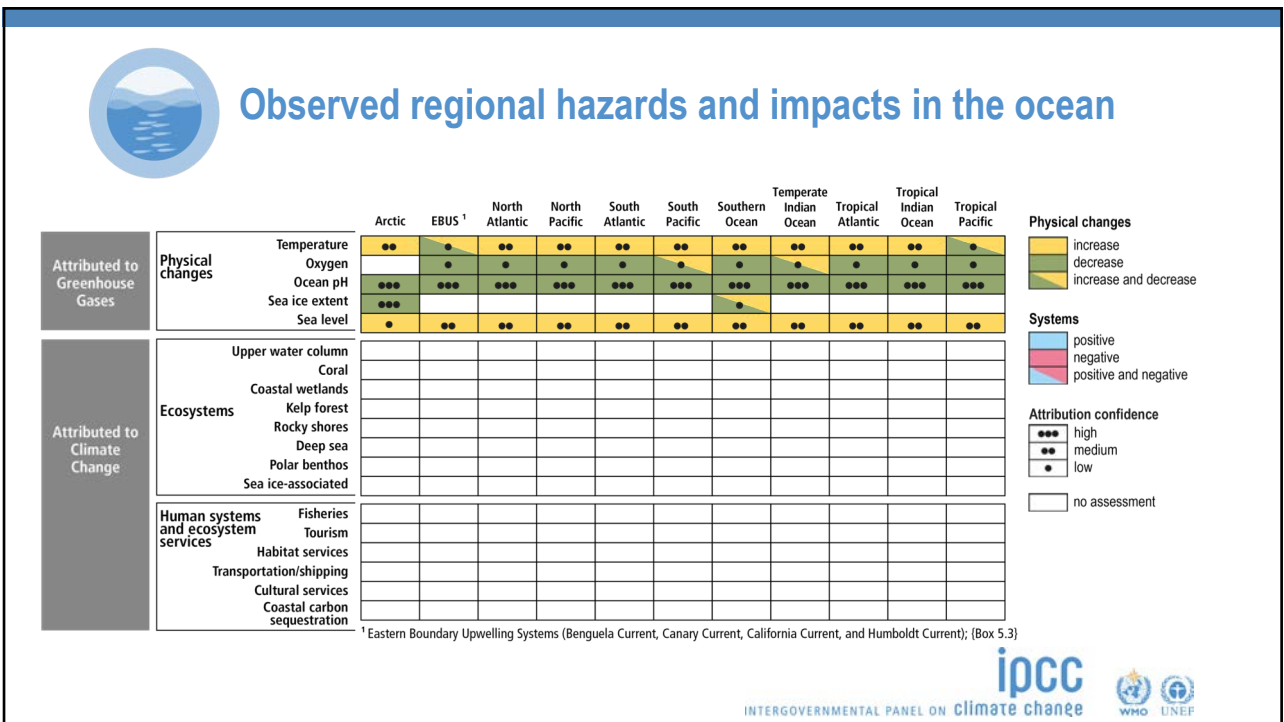


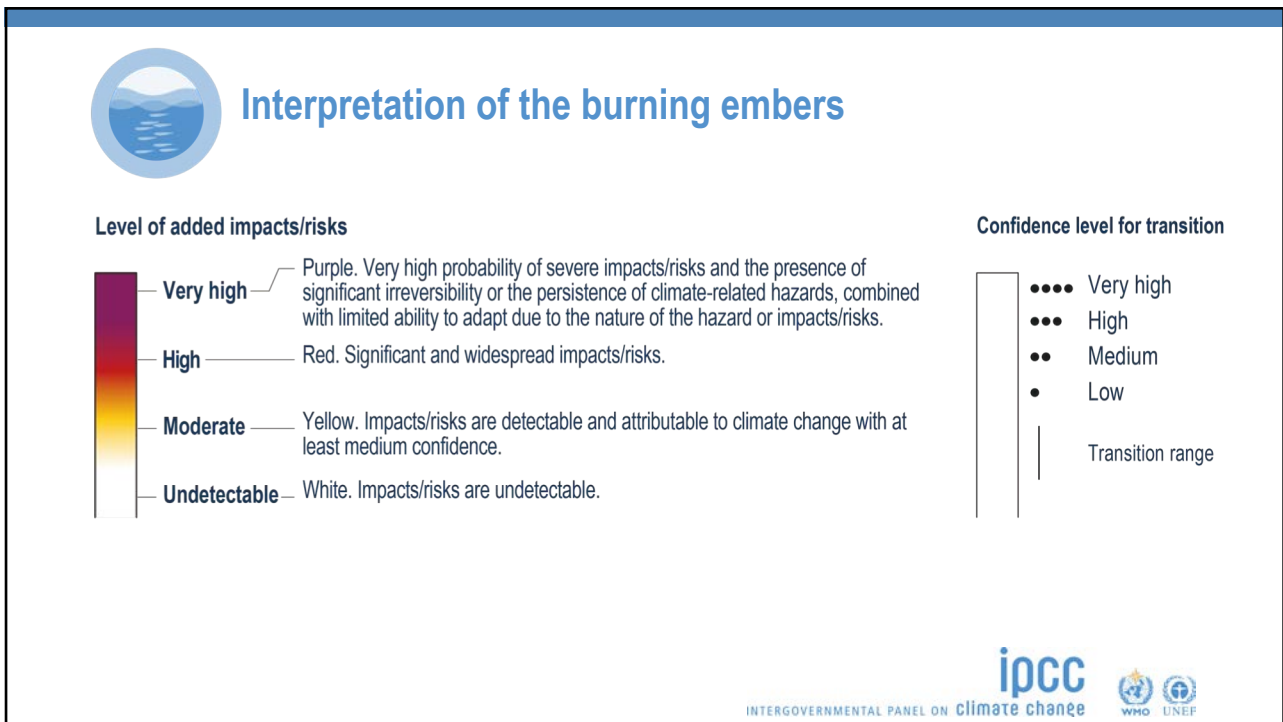
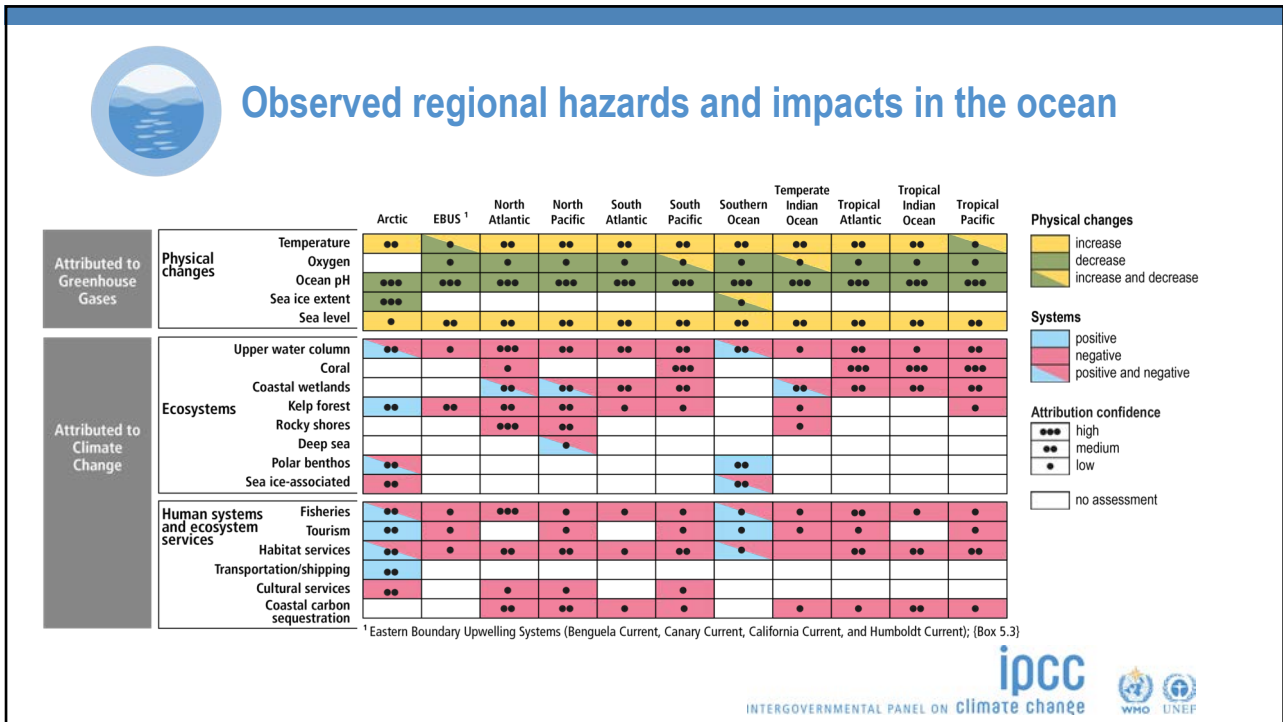
SBSTA-IPCC special event: Unpacking the new scientific knowledge and key findings in the Special Report on the Ocean and Cryosphere in a Changing Climate



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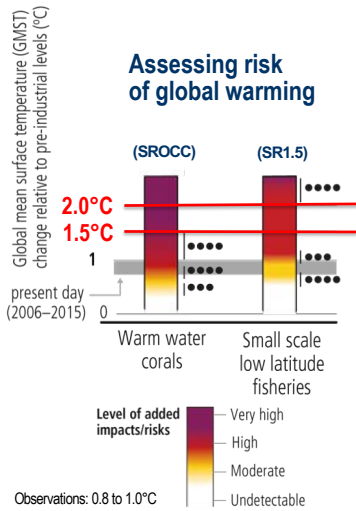
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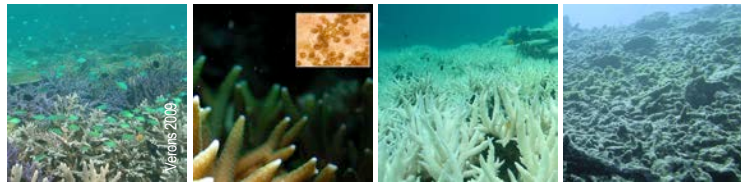


Marine heatwaves have already resulted in large-scale coral bleaching events causing worldwide reef degradation

Vulnerable Ecosystems identified in AR5, SR1.5, SROCC



Even in a 1.5°C warmer world.... high risk of losing 70 to 90% of Coral Reefs and associated services for humankind ... even more at 2°C



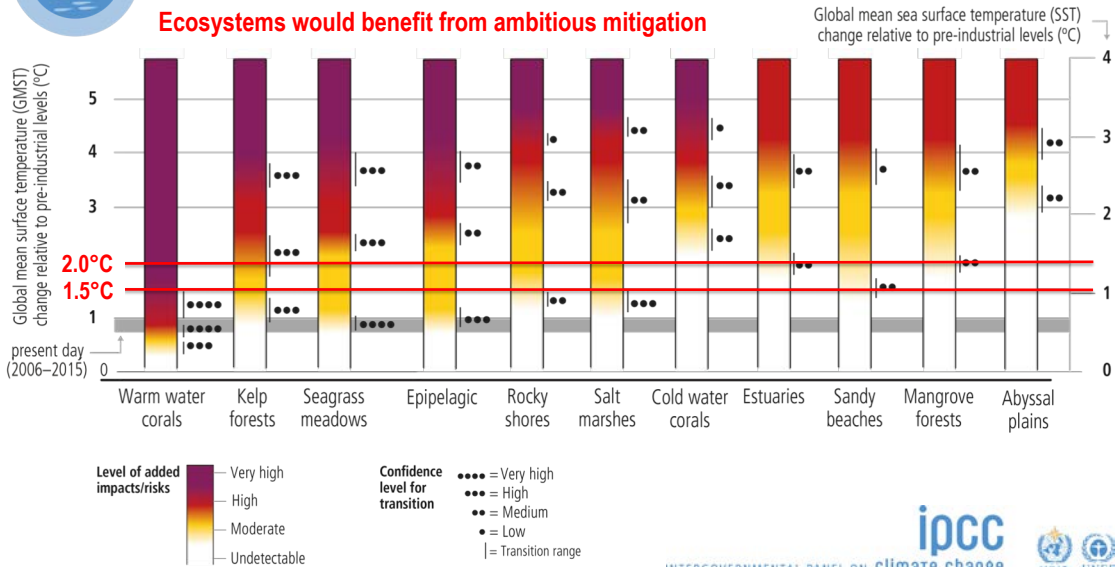
Confidence level for transition

- = Very high
- = High
- = Medium
- = Low
- | = Transition range



Future risks for ocean and coastal ecosystems

Ecosystems would benefit from ambitious mitigation





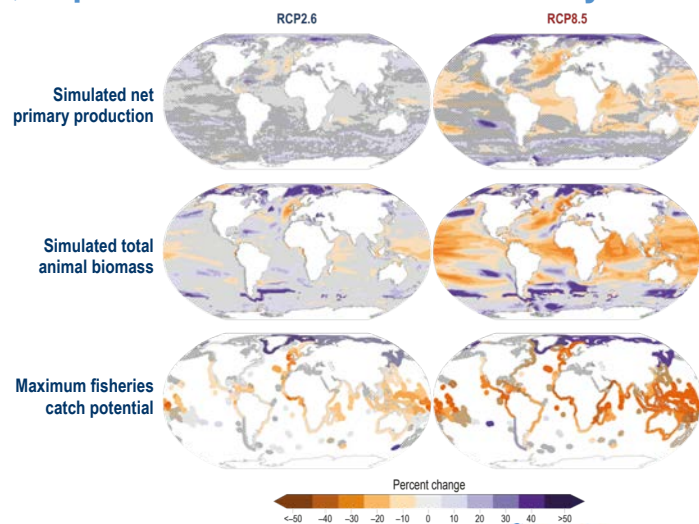
Risks to ocean and coastal ecosystems increase with the level of warming

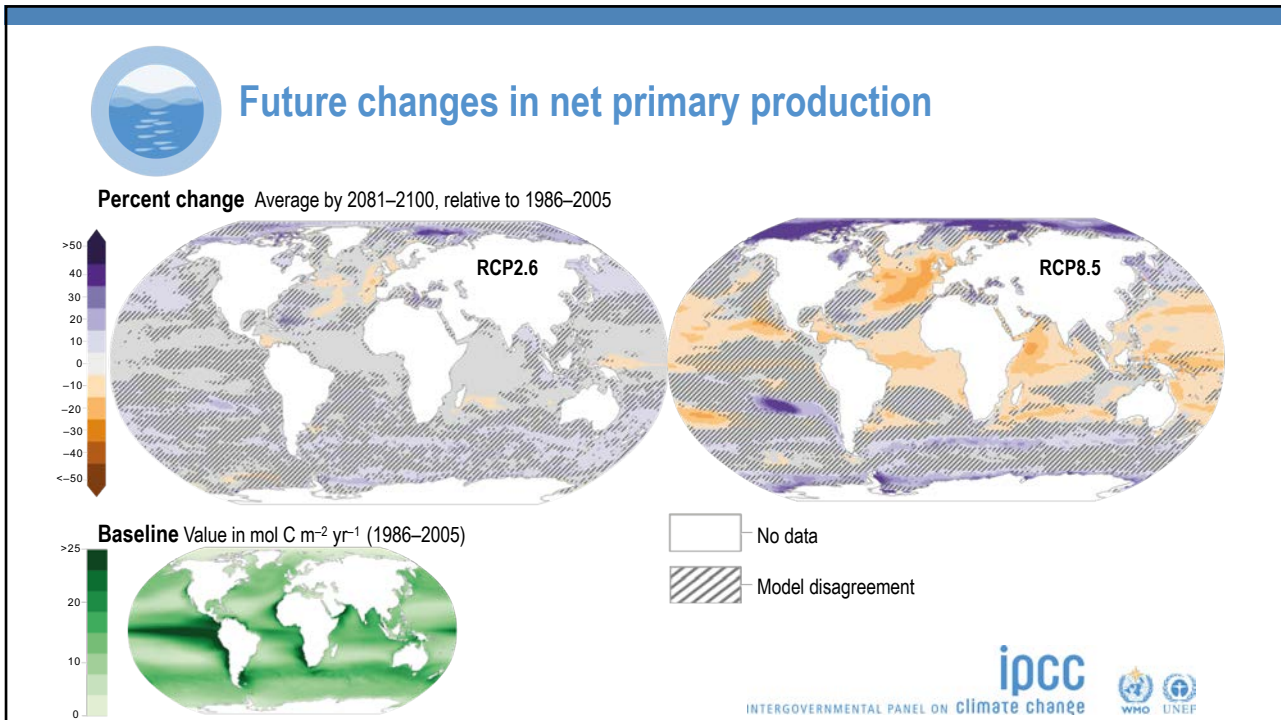
- Projected ecosystem responses include **losses of species habitat and diversity**, and **degradation of ecosystem functions**
- Warm-water **corals** are at **high risk already** today
- Most **coastal ecosystems**, including seagrass meadows and kelp forests, are at moderate to high risk at 1.5°C, and **risk increases at 2°C**
- Ecosystems would benefit from **keeping warming at or below 1.5°C**



Future changes, impacts and risks for ocean ecosystems

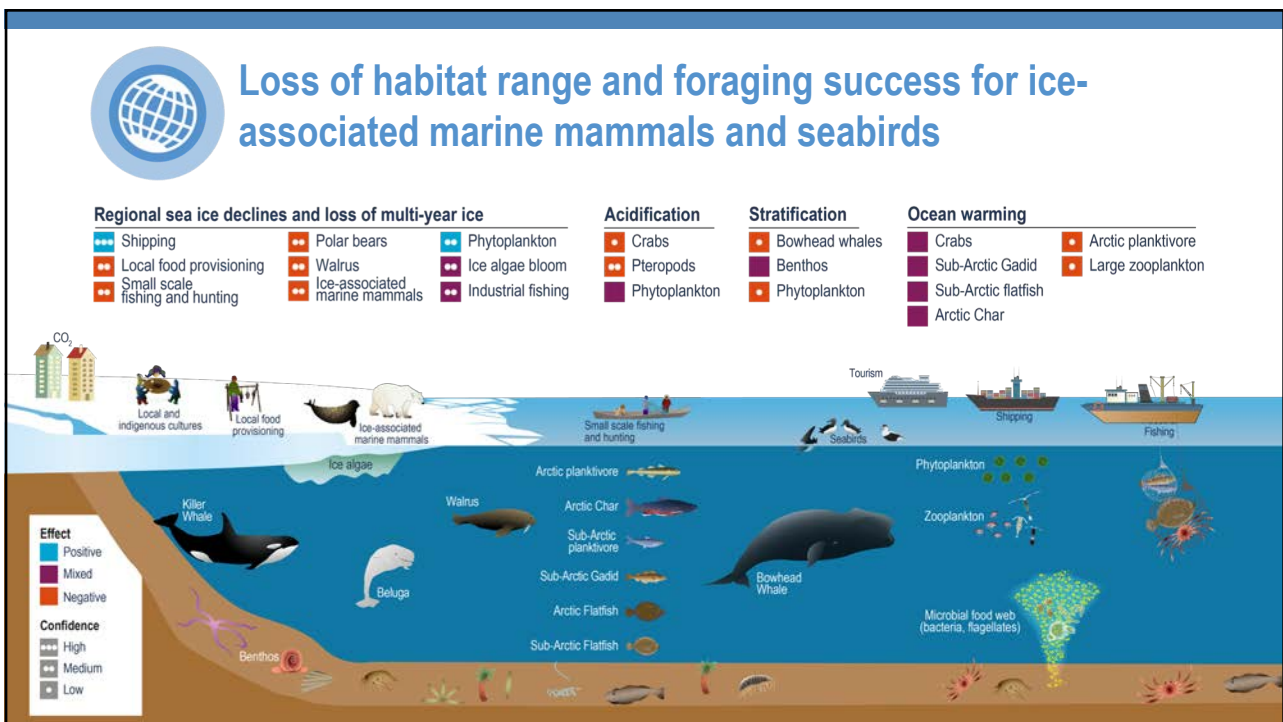
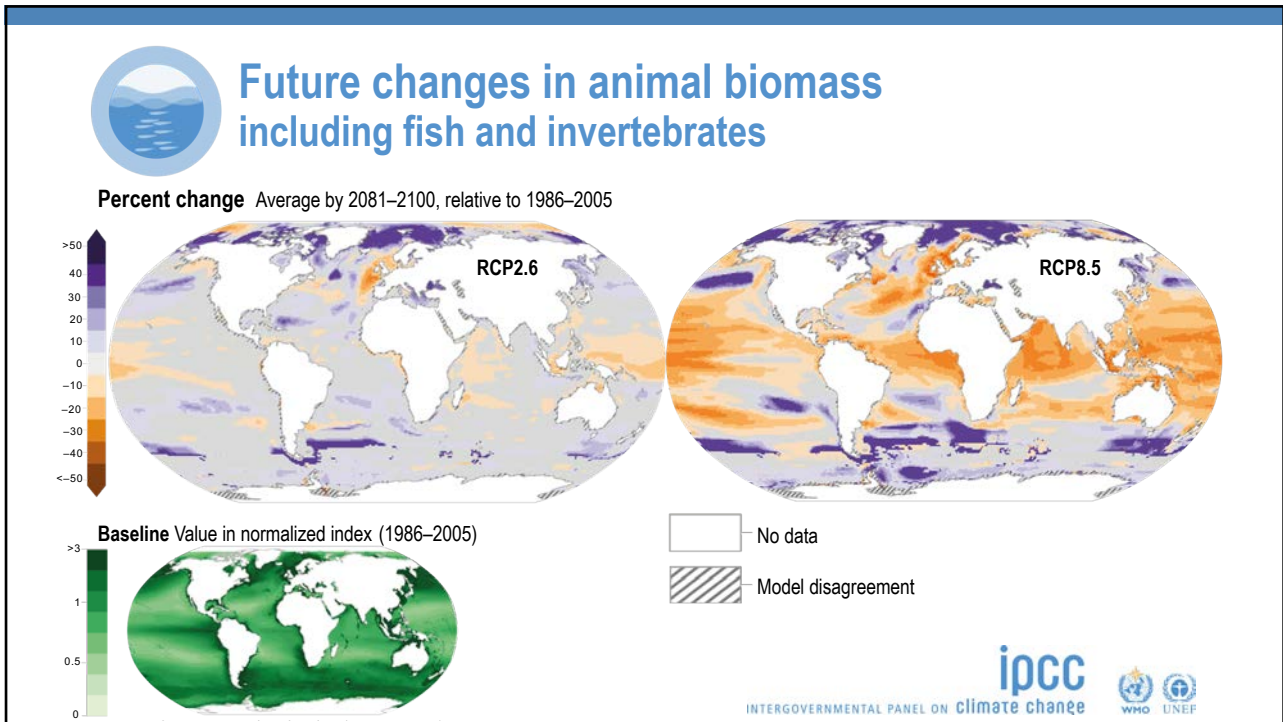
- Physical and biogeochemical changes in the ocean affect primary production, i.e. the base of the oceanic food web
- Marine animals such as fish and invertebrates are directly and indirectly affected by the abiotic and biotic changes in the ocean

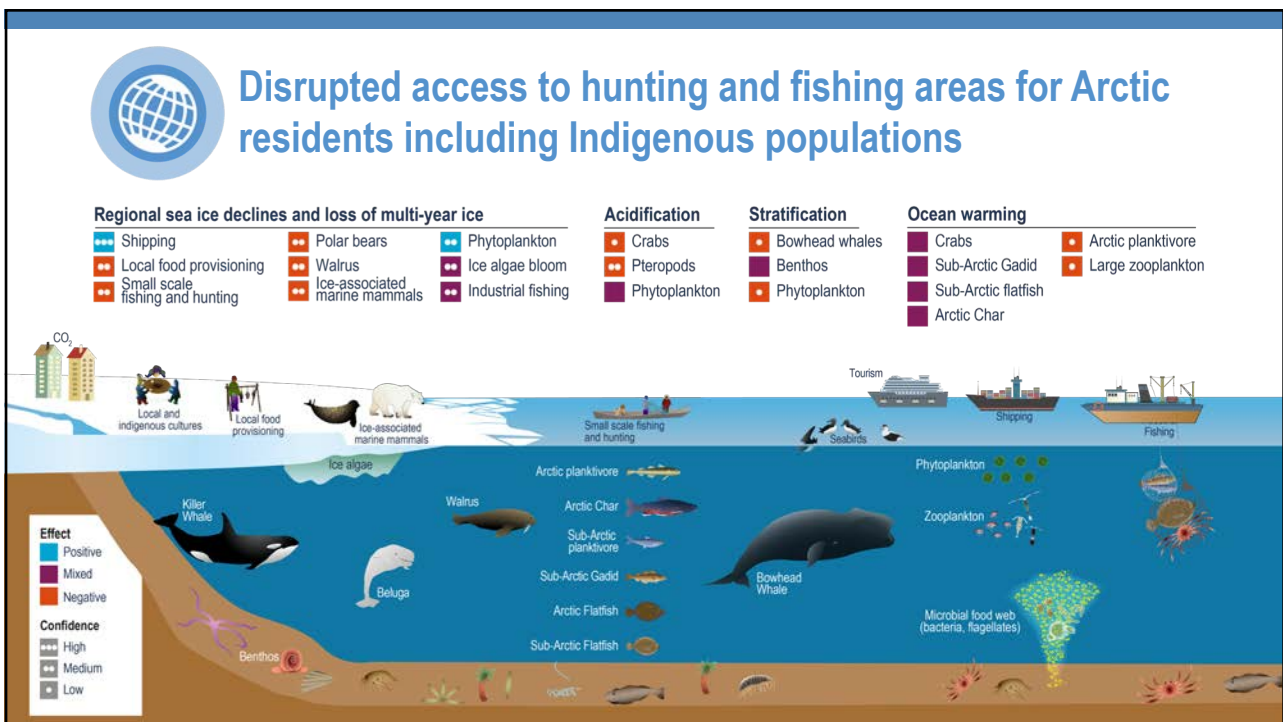
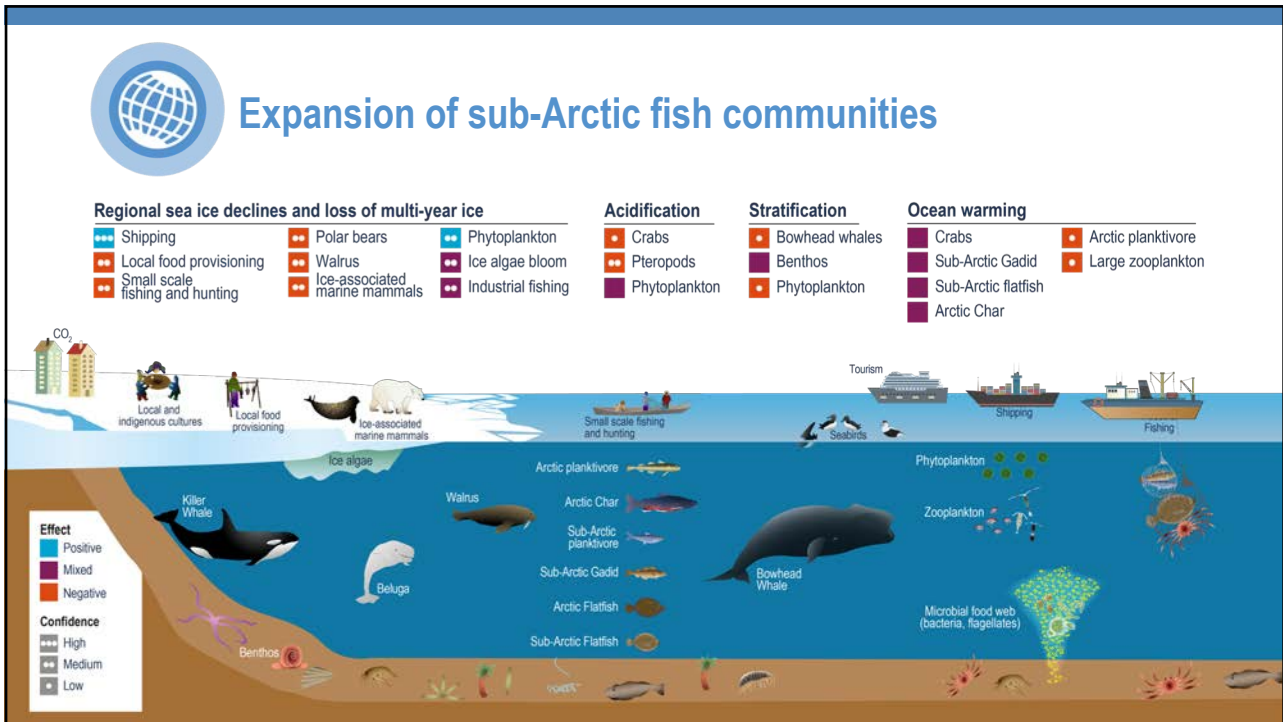


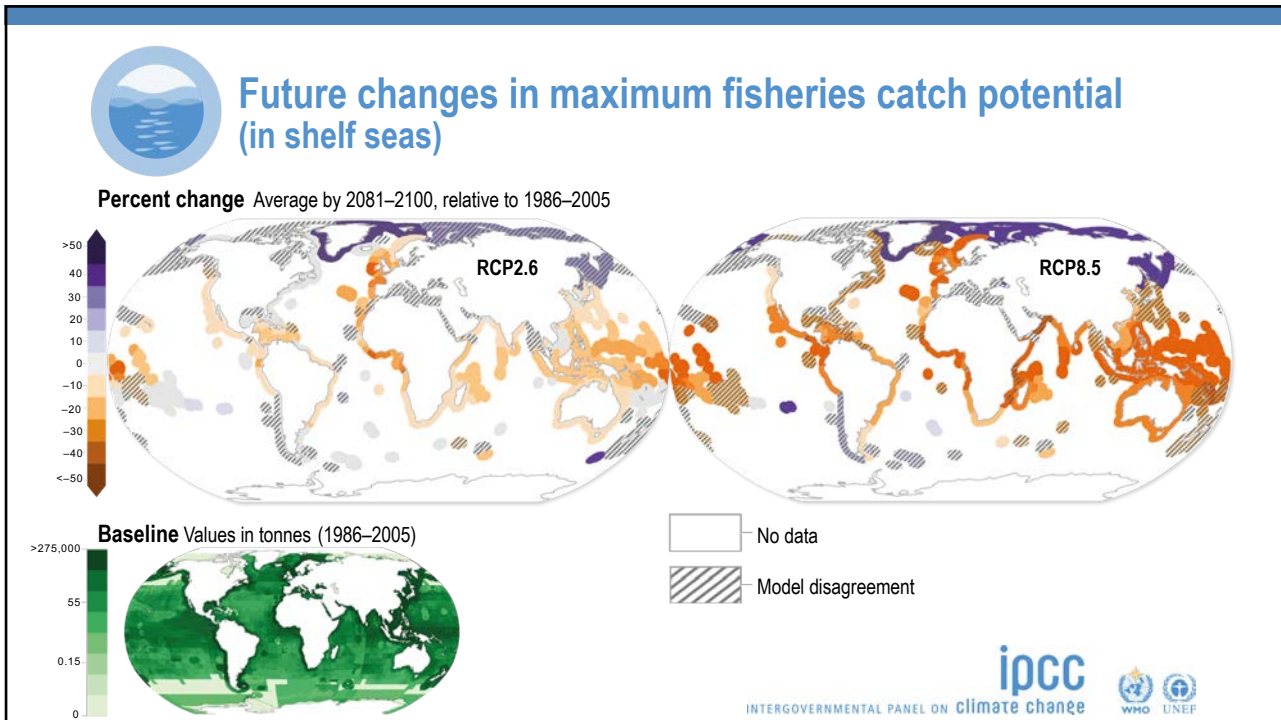


Ocean warming and changes in net primary production alter biomass, production and structure of marine ecosystems.

- In recent decades, **Arctic net primary production** has **increased** in ice-free waters and is projected to further increase
- Cascading effects on **polar zooplankton** have affected **food web structure and function and fisheries**
- The habitat of **Antarctic krill**, a key prey species for penguins, seals and whales is projected to **contract southwards**
- Under high emissions scenario, net primary production in **tropical oceans** will **decline** 7-16% by 2100







Future changes in marine species distribution and production

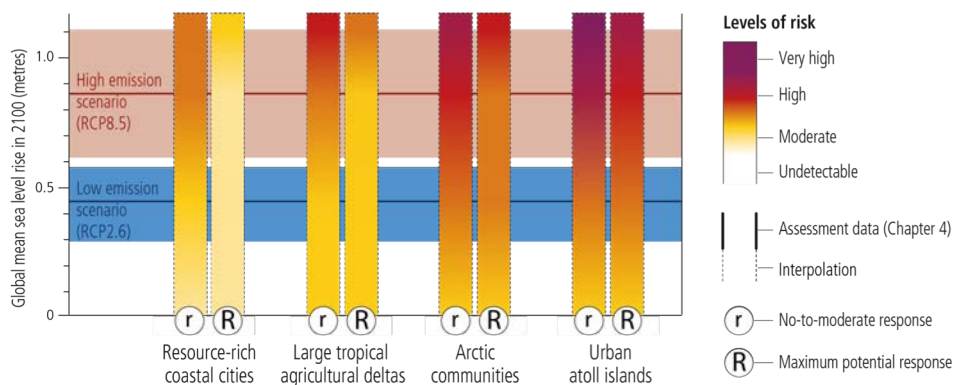
- Life is specialized on **limited temperature ranges**
- Changes in the ocean cause **shifts in fish populations and catch potential**
- These have **positive and negative impacts on catches, economic benefits, livelihoods, and local culture**
- Global warming and biogeochemical changes have already contributed to **reduced fisheries catches** in many regions
- Communities (e.g., **Arctic, Small Island Developing States**) that depend highly on seafood may face **risks to nutritional health and food security**

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Sea level rise risk and responses

Risk for illustrative geographies based on mean sea level changes

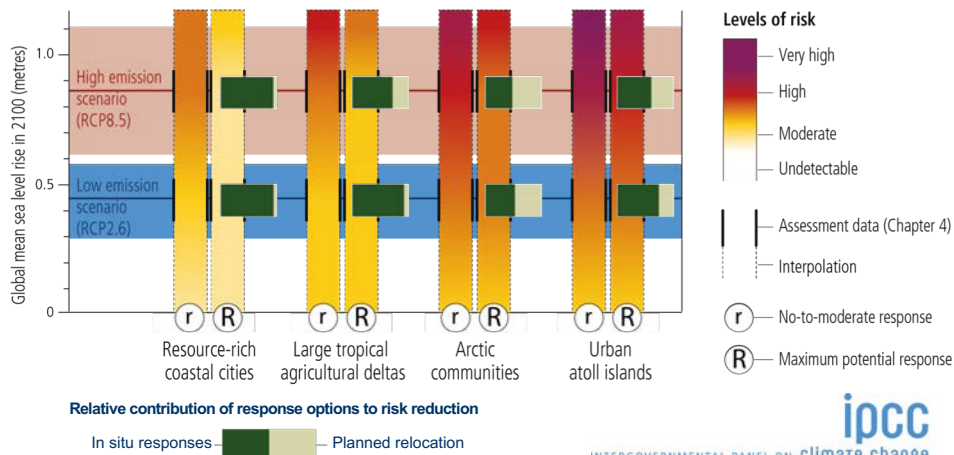




Sea level rise risk and responses

Risk for illustrative geographies based on mean sea level changes

Response capacities and adaptation limits differ between locations and regions



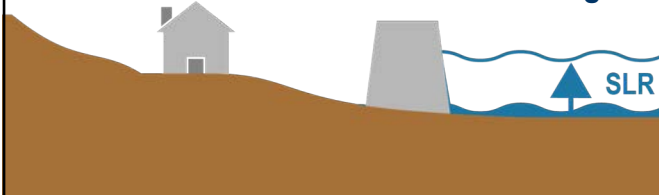
Various adaptation responses to sea level rise are already being implemented:

- Hard protection
- Sediment-based protection
- Ecosystem-based adaptation (corals, wetlands)
- Coastal advance
- Coastal accommodation
- Retreat



Hard Protection

- **Effectiveness:** multiple metres of Sea level Rise
- **Advantages:** predictable levels of safety
- **Co-benefits:** multifunctional dikes (e.g. recreation, other land use)
- **Drawbacks:** destruction of habitat
- **Economic Efficiency:** high if the value of assets behind protection is high
- **Governance Challenges:** often unaffordable for poorer areas



Coastal Advance

- **Effectiveness:** multiple metres of sea level rise
- **Advantages:** predictable levels of safety
- **Co-benefits:** generates land and land sale revenues
- **Drawbacks:** groundwater salinisation, enhanced erosion and loss of coastal ecosystems and habitat
- **Economic Efficiency:** very high if land prices are high
- **Governance Challenges:** often unaffordable for poorer areas

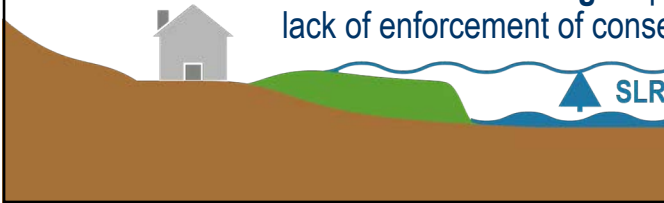




Ecosystem-based Adaptation

(coral and wetland conservation or restoration)

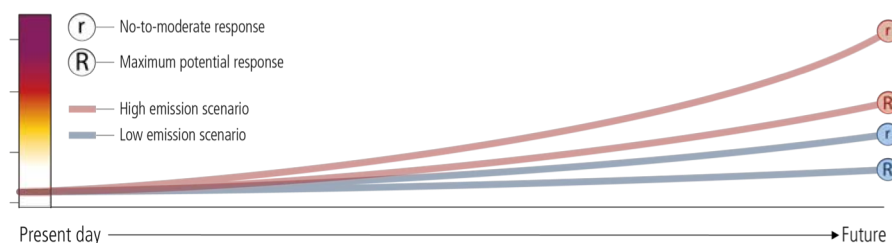
- **Effectiveness:** effective up to 0.5–1 cm y⁻¹ sea level rise
- **Advantages:** opportunity for community involvement
- **Co-benefits:** habitat gain, biodiversity
- **Drawbacks:** corals: long-term effectiveness depends on ocean warming, acidification and emission scenarios; wetlands: safety levels less predictable, a lot of land required
- **Economic Efficiency:** limited evidence on benefit–cost ratios
- **Governance Challenges:** permits difficult to obtain, lack of finance, lack of enforcement of conservation policies



Time dependent risk reduction ... time-limited benefits

- Schematic illustration of **risk reduction** and the **delay** of a given risk level through responses to sea level rise and/or mitigation
- The amount of risk reduction and delay depends on sea level and response scenarios and varies between contexts and localities

Levels of risk related to sea level rise

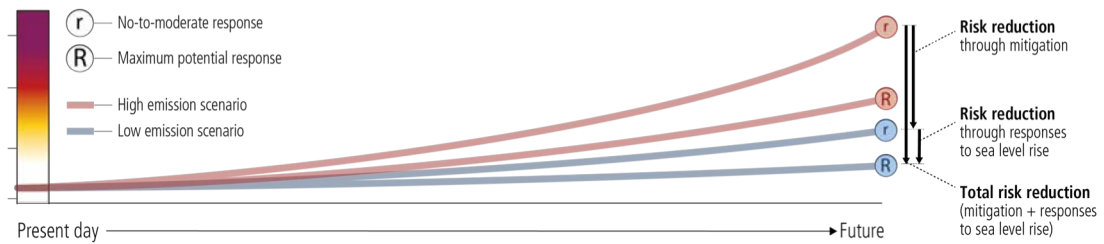




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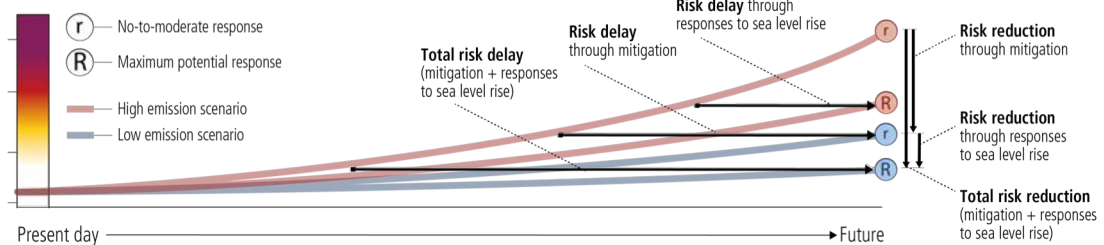
Levels of risk related to sea level rise



Time dependent risk reduction ... time-limited benefits

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Levels of risk related to sea level rise





Benefits of responses to sea level rise and mitigation

- Risk may continue to increase at different rates, exemplified by sea level rise, also depending on the **capacity of responses**, i.e. local adaptation and/or retreat, as well as depending on **mitigation efforts**
- Risk reduction through adaptation may therefore be **time limited**,
...emphasizing the urgency of sufficient action

Our ocean and cryosphere –
They sustain us.
They are under pressure.
Their changes affect all our lives.

The time for action is now.

More Information:

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