

A Climate Risk Index for Marine Life: A NEW APPROACH FOR CLIMATE-ADAPTED MARINE CONSERVATION & FISHERIES MANAGEMENT



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Climate change is impacting all marine life. To ensure that the marine environment can continue to sustain future generations, management, conservation, and adaptation strategies need to account for the effects of climate change on species, ecosystems, and societies. An innovative new study¹ has developed the **Climate Risk Index for Marine Life**.

The findings of that study are summarized here.

Highlights:

- The climate risk for marine life is **strongly dependent on future greenhouse gas emissions**.
- Under continued high emissions, **87% of marine species are projected to experience a high risk of adverse climate change impacts** across most of their geographic area by 2100.
- **Commercially fished species** that are large, long lived and range restricted are the **most vulnerable**.
- **Top predators are disproportionately vulnerable** as they represent a small fraction of marine biomass and are often economically valuable.

- **Ecosystems in the tropics, some polar regions, and those found nearshore** are more at risk as they are both areas of high biodiversity and sources of food for humans.
- **Risk is higher in countries that have lower levels of wealth and food security and a higher dependency on fisheries.**
- **High emissions are likely to fundamentally alter the structure of marine ecosystems**, with consequences for energy transfer, ecosystem stability, and functioning.
- **Mitigating emissions reduces the risk for virtually all marine species** (98.2%), enhances ecosystem stability, and reduces risk the most for low-income countries with high dependence on fisheries.
- **Climate risk assessments can help inform climate-adaptive marine conservation and fisheries management** as risk varies across species and within the geographic distributions of each species.

¹Boyce, D.G., Tittensor, D.P., Garilao C., Henson S., Kaschner K., Kesner-Reyes, K., Pigot, A., Reyes Jr., R.B., Reygondeau, G., Schleit, K. E., Shackell, N.L., Sorongon-Yap, P., Boris Worm, B. (2022). A climate risk index for marine life. Nature Climate Change. Advance online publication. <https://www.nature.com/articles/s41558-022-01437-y>

A CLIMATE RISK INDEX FOR MARINE LIFE

The climate risk index was evaluated for 24,975 marine species according to:

- The species' **present-day sensitivity** to climate change;
- Their **projected future exposure** to climate change; and
- Their innate **potential to adapt**.

A climate risk index is spatially explicit, reproducible and a flexible approach for species and ecosystems. It can help identify priority ecosystems that are in urgent need of conservation globally. Climate risk scores can be helpful to local, national, and regional marine spatial planning, which include the current plans to protect at least 30% of the ocean by 2030. The risk scores can also be used to identify priority areas where pressures such as pollution or fishing can be minimized, or to design protection networks that encompass climate change hotspots and refugia. In addition, these risk scores can help prioritize fisheries management actions to protect important commercial fisheries.

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Recommendations for decision makers:

- Limit global warming to 1.5°C to mitigate climate change impacts on marine life, including economically important fisheries and at-risk marine species.
- Strengthen international cooperation and financing to address socioeconomic inequities in climate risk to marine species, especially for low-income countries with a high dependence on fisheries.
- Conduct and use climate risk indices to:
 - Identify priority ecosystems and species for conservation.
 - Develop and implement conservation plans for species at risk.
 - Develop fisheries harvest strategies that account for geographic variation in climate risk across the distribution of individual marine species.
 - Determine how climate change will impact socio-economically dependent communities.
 - Support and inform risk communication with stakeholders.
 - Monitor changing vulnerability and risk of species, ecosystems and fisheries over time.



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