

From ocean to plate: community level climate change impacts on sustainable seafood

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Scientists across the globe are sounding the alarm on the profound impacts that climate change is causing on wildlife on land and in the oceans. While on the one hand governments are called to action to curb emissions and avoid further global warming in the future, on the other, managers responsible for the sustainable use of natural resources must adapt current governance, monitoring, and science advice tools to take into account new, unprecedented effects.

In marine systems, Seasonal and spatial changes in nutrient availability and primary productivity, species-specific shifts in distribution, growing or contracting population abundances, altered reproductive behaviour, are affecting how predators and prey overlap, disrupting ecosystem structure and functioning. In an extremely dynamic environment, for which data are collected for a limited fraction of the areas and the species that are exploited, sustainable fisheries management must now address new sources of variability that are changing which fish can be caught, where, and how much.

These new changes create sometimes unexpected emergent effects on the efficacy of current regulations. For example, as fish shift their distribution patterns in search of cooler waters, they can cross jurisdictional boundaries and be caught by new fleets, creating conflicts over how their catches should be shared by different States, such as the case of Atlantic mackerel (*Scomber scombrus*) in the Northeast Atlantic Ocean. Changes in species' migration routes in search for food can have dramatic consequences, as is the case for the highly endangered Northern right whales (*Eubalæna glacialis*) venturing in new areas and getting entangled in the floating ropes linked to snow crab (*Chionoecetes opilio*) traps. These events occurred in fisheries management systems considered among the best managed and resourced across the globe and certified to the Marine Stewardship Council (MSC) sustainability Standard. In these examples, not only did climate change highlight weaknesses in governance systems that previously appeared effective, but this change also caused them to lose access to sustainable seafood markets.

Seafood eco-certification was designed as a strategy to incentivise sustainable fishing practices by giving market recognition to products sourced from well-managed fisheries. To be effective, this approach requires a clear and operational definition of sustainability that can be used to benchmark fisheries. Using examples from the MSC certification program, I'll discuss how climate change is now putting to the test the way we model, monitor and manage fisheries to be truly sustainable and resilient. Finally, I will discuss how, by challenging fisheries governance, climate change may be forcing managers to adopt a more holistic perspective on how we view marine food webs.