



North Atlantic ecosystems under threat at “critical” sea temperature

Rising sea temperatures place various pressures on marine species, sometimes causing dramatic ecosystem-wide changes. A new study has found that in the North Atlantic these “shifts” tend to occur around a critical temperature threshold. As these temperatures are predicted to reach northern areas of Europe over the coming century, careful monitoring and planning is needed to anticipate and manage these changes.

Climate change is often viewed as a gradual process, but in some cases the effects of climate change on ecosystems can be both rapid and severe. In the North Pacific Ocean, for example, rising sea temperatures triggered a dramatic ecosystem or “regime” shift in 1977, resulting in widespread impacts on species richness. Such abrupt shifts are well documented but poorly understood. More research is required to establish how marine management strategies should be adapted to cope with these future shifts.

A new study by researchers based in the UK and France has shown that even small increases in sea temperature can cause abrupt ecosystem shifts. The study analyses the effects of climate change on ecosystems in the North Atlantic over the last half century and identifies a crucial threshold in sea surface temperature of 9-10°C. At around this threshold, an increase in temperature related to climate makes marine ecosystems to become unstable.

The researchers analysed data on cod stocks, plankton (diversity and size), sea surface temperature and oxygen levels gathered in the North Atlantic region between 1958 and 2005. They show that during the 1980s, the region experienced a period of abrupt ecosystem shift, in terms of the size, abundance, and diversity of organisms. The changes coincided with an increase in temperature above the critical threshold. This temperature rise, they suggest, is linked to major ecosystem shifts reported across the entire region for the period.

By modelling future climate change, the researchers are also able to estimate when various latitudes will reach the threshold temperature. According to their projection, Norway is likely to reach the threshold over the coming century, restricting habitats for Atlantic cod and leading to an irreversible decline in populations. However, they stress that over-fishing is likely to push cod stocks past the point of recovery long before climate change.

If climate change progresses as projected by the Intergovernmental Panel on Climate Change, there will be no means of avoiding these abrupt ecosystem shifts. However, changes within ecosystems may act as early indicators of further, greater changes to come. With this in mind, the researchers suggest close monitoring combined with flexible marine management strategies to accommodate for rapid shifts.

These approaches are relevant to the European Commission’s recently adopted “roadmap” for maritime spatial planning¹, which aims to balance economic activities, such as fishing, with protection of the marine environment. In this context, rising sea temperatures are an important factor and will determine how these economic activities develop in different regions over time.

1. See: http://ec.europa.eu/maritimeaffairs/spatial_planning_en.html

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