

# Difficult to foresee how global warming will influence life in oceans and lakes based on existing research

November 16 2016, by Annika Sand

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There is no doubt that global warming is occurring and that air, surface, and water temperatures will continue to increase in the 21st century. But how reliable are current projections regarding consequences of future climate change for biodiversity?

Climate change will impact on biodiversity, ecosystems, and the human societies that depend on them. This has raised much concern and attracted huge scientific interest. However, because of methodological approaches used, many uncertainties remain regarding how future temperature change will affect biodiversity in marine and freshwater environments, according to findings of a recent review article.

By the end of December 2015 more than 140.000 scientific articles had been published on climate change and [global warming](#). But how reliable are current projections regarding consequences of future climate change for biodiversity? To address this issue, researchers from Linnaeus University in Sweden analysed the methodological approaches used in previous research. They focussed on a subset of studies that have investigated how temperature shifts influence life in marine and freshwater environments.

The reviewed studies included field surveys and experiments performed either in the laboratory or under natural conditions. Hanna Berggren who conducted the literature search explains: "We recorded the response

variables considered, species investigated, duration of the studies, and the nature of temperature manipulations. Next, we compared the patterns with prognostications of future rates and magnitudes of climate change."

The findings of the review were recently published in the special issue "Impacts of Climate Change on Marginal Ecosystems – the Baltic Sea" of the *Journal of Marine Science and Engineering*. Because of the approaches used in the previous studies, ecological and evolutionary responses of individuals, populations, species, and ecosystems to temperature change were in many cases difficult to establish, and causal mechanism often remained ambiguous, according to the review authors.

Lead author Professor Anders Forsman elaborates: "We discovered that the thermal stress used in experimental studies was 10,000 times more severe than projections of future warming of the oceans. There is of course a trade-off between realism and methodological tractability, but it is important to find the right balance. "

The approaches used in the studies can provide important insights into how individuals and ecosystems respond to heterogeneous environments and short term temperature changes associated with variable weather conditions or seasonality. However, the degree to which they can also inform about more long-term consequences of future [climate change](#) remains uncertain, argue the authors.

Anders Forsman concludes: "We anticipate that some of our peers will be provoked by the findings and conclusion in our review. However, our aim is to ultimately advance knowledge and understanding of these complex issues. It is crucial that resources and facilities are obtained for large-scale and long-term studies with greater realism."

**More information:** Anders Forsman et al. To What Extent Can

Existing Research Help Project Climate Change Impacts on Biodiversity in Aquatic Environments? A Review of Methodological Approaches, *Journal of Marine Science and Engineering* (2016). [DOI: 10.3390/jmse4040075](https://doi.org/10.3390/jmse4040075)

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