

Danger for the world's oceans and biodiversity

Insightful study with participation from the University of Konstanz warns of human-induced impacts on the marine ecosystem.

A thought-provoking review led by an international team of researchers reveals the critical, yet poorly studied role of salinity in a changing ocean and coastline. The study underlines how changes in salinity could have potentially devastating impacts on the vital ecosystems and describes how this might affect coastal communities. Titled "Human-induced salinity changes impact marine organisms and ecosystems", the study was published in the journal *Global Change Biology*. Lead author of the study is biologist Till R  thig from the Fraunhofer Institute for Molecular Biology and Applied Ecology in Giessen. Co-author Christian Voolstra is professor of genetics of adaptation in aquatic systems at the University of Konstanz.

R  thig explains: "Our work shows that salinity is the elephant in the room. While we know comparably well how changing temperatures, acidification and nutrients affect ocean and coastal ecosystems, the effects of human-induced changes in salt content, or salinity, are severely understudied – even though salt exposure levels are crucial for all kinds of organisms, including plants, animals and microorganisms".

Human activities amplify impacts

Coastal and estuarine ecosystems, known for their high productivity, are particularly vulnerable to the impacts of salinity changes. The review emphasizes that climate change-related variations in rainfall can lead to extreme flood and drought events, affecting freshwater availability and subsequently impacting these sensitive ecosystems. Moreover, the authors highlight the compounding effects of local human activities, such as changes in land use, urbanization, river regulation and terrestrial runoff, which further exacerbate the challenges faced by coastal regions.

Salinity is a central factor for many metabolic processes – marine organisms are built to live in salty environments. Salinity is also interacting with other physical and chemical properties, such as temperature and oxygen levels, and thereby shapes the physical environment of the ocean", explains Professor Voolstra from the University of Konstanz.

The researchers warn that salinity changes are predicted to intensify alongside ocean warming, deoxygenation, nutrient enrichment and increased sediment loads due to climate change and human activity. Expansion caused by warming, freshwater addition and salinity changes contribute to sea-level rise that causes saltwater inflow in coastal and low-lying areas, disrupting ecosystem structures and functions.

Challenges need to be addressed urgently

The authors stress the urgency of addressing these salinity-related challenges to safeguard marine and coastal ecosystems and biodiversity. They highlight the vulnerability of selected habitats and their keystone members including implications of salinity changes on microorganisms, plankton, coral, mangroves, tidal marshes, macroalgae and seagrass.

"Our data show that projected salinity changes alone can lead to ecosystem collapse", Professor Voolstra points out.

"Unfortunately, salinity change will not happen in a bubble, and these sensitive ecosystems will also have to cope with changes in temperature, oxygen, acidification and pollution. These interacting effects are a massive black box in terms of understanding and managing the future of our oceans and coasts".

The review provides valuable insights into the threats posed by anthropogenic salinity changes to marine and coastal ecosystems and outlines consequences for health and economy of the local communities in the oftentimes densely populated regions.

Press release

12-Jul-2023

Source: Universität Konstanz

Further information

University of Konstanz
Communications and Marketing
78457 Konstanz
Phone: +49 (0)7531 88 3603

► [University of
Konstanz](#)