

Researchers discover expanding and intensifying low-oxygen zone in the Arabian gulf

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Hammour in Arabian Gulf. Credit: John Burt, NYU Abu Dhabi

A team of researchers from the Arabian Center for Climate and Environmental Sciences (ACCESS) at NYU Abu Dhabi (NYUAD)

studied the evolution of dissolved oxygen in the Arabian Gulf over three decades and discovered a significant decline in oxygen concentrations and the expansion of the seasonal near-bottom hypoxic zone (lower oxygen levels near the bottom of the Gulf in certain seasons). The researchers conclude that changes in local climate are altering the Gulf's physical and biogeochemical environment with potential implications for the ecosystems and the fisheries of the region.

In the paper titled "Recent expansion and intensification of hypoxia in the Arabian Gulf and its drivers" published in the journal *Frontiers in Marine Science*, the researchers used a sophisticated ocean model to simulate hypoxia near the sea bottom, from 1982 to 2010. The results indicated an expansion and intensification of hypoxia in the central Gulf, accompanied by a lengthening of the hypoxic season.

Because of the scarcity of observations of the area, the dynamics of hypoxia in the Gulf remain largely unknown. This is the first study to model the biogeochemistry of the Gulf. This is also the first time that researchers have explored the drivers of large-scale hypoxia in the Gulf and its seasonal and long-term variability.

The expansion and intensification of hypoxia in the Gulf has the potential to alter its biogeochemistry and [marine ecosystems](#) in various ways. Hypoxia can cause fish mortality, lead to a loss of marine biodiversity, and may also cause distribution shifts as fish migrate to avoid hypoxic stress. This can alter the community structure of reef ecosystems and increase the vulnerability of the Gulf coral reefs to ongoing warming and [climate change](#).

"Oxygen is an essential molecule, vital for the survival of the marine organisms and fish populations in the area. Our team found that the seasonal hypoxic zone in the Arabian Gulf has grown by over 50 percent since the 1980s, and it is now persisting for several more months each

year compared with several decades ago," said lead author Zouhair Lachkar, a senior research scientist at ACCESS.

Associate Professor of Biology at NYUAD and co-author of the report John Burt added, "The expansion and intensification of these low-oxygen waters in the central Gulf represents a growing threat to regional fisheries, with this [hypoxic zone](#) growing steadily towards the UAE's offshore fishing grounds. We will continue to study the evolution of this phenomenon and will work with the relevant government agencies to assess this risk going forward as climate change continues to put pressure on our marine systems."

More information: Zouhair Lachkar et al, Recent expansion and intensification of hypoxia in the Arabian Gulf and its drivers, *Frontiers in Marine Science* (2022). [DOI: 10.3389/fmars.2022.891378](https://doi.org/10.3389/fmars.2022.891378)

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