

Rising acidity levels could trigger shellfish revenue declines, job losses

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Ocean acidification could harm a wide range of marine organisms and the food webs that depend on them. Mollusks -- including mussels and oysters, which support valuable marine fisheries -- are particularly sensitive to changes in seawater pH. Credit: Tom Kleindinst, Woods Hole Oceanographic Institution

changes in ocean chemistry -- a consequence of increased carbon dioxide

(CO₂) emissions from human industrial activity — could cause U.S. shellfish revenues to drop significantly in the next 50 years, according to a new study by researchers at the Woods Hole Oceanographic Institution.

Intensive burning of fossil fuels and deforestation over the last two centuries have increased CO₂ levels in the atmosphere by almost 40 percent. The oceans have absorbed about one-third of all human-generated [carbon emissions](#), but the buildup of CO₂ in the ocean is pushing surface waters toward more acidic conditions.

This "ocean acidification" creates a corrosive environment for marine organisms such as corals, marine plankton, and shellfish that build carbonate shells or skeletons. Mollusks — including mussels and oysters, which support valuable [marine fisheries](#) — are particularly sensitive to these changes.

In a case study of U.S. commercial fishery revenues published in the June issue of *Environmental Research Letters*, WHOI scientists Sarah Cooley and Scott Doney calculated the possible economic effects of ocean acidification over the next 50 years using atmospheric CO₂ trajectories from the Intergovernmental Panel on Climate Change and laboratory studies of acidification's effects on shell-forming marine organisms, focusing especially on mollusks.

Mollusk sales by fishermen currently generate about \$750 million per year — nearly 20 percent of total U.S. fisheries revenue. The study assumed that mollusks harvests in the U.S. would drop 10 to 25 percent in 50 years' time as a result of increasing acidity levels, which would decrease these mollusk sales by \$75 to \$187 million dollars annually.

"Losses in primary revenue from commercial mollusk harvests—or the money that fisherman receive for their catch—could add up to as much

as \$1.4 billion by 2060," said Cooley.

Reduced harvests of mollusks, as well as losses of predatory fish and other species that depend on mollusks for food, could lead to economic hardships for fishing communities.

"Ocean acidification will impact the millions of people that depend on seafood and other ocean resources for their livelihoods," said Doney.

"Losses of crustaceans, bivalves, their predators, and their habitat — in the case of reef-associated fish communities — would particularly injure societies that depend heavily on consumption and export of marine resources."

Because changes in seawater chemistry are already apparent and will grow over the next few decades, Cooley and Doney suggest measures that focus on adaptation to future CO₂ increases to lessen the impact on marine ecosystems, such as flexible fishery management plans and support for fishing communities.

"Limiting nutrient runoff from land helps coastal ecosystems stay healthy," said Cooley. "Also fishing rules can be adjusted to reduce pressure on valuable species; fisheries managers may set up more marine protected areas, or they may encourage development of new fisheries."

Source: Woods Hole Oceanographic Institution

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