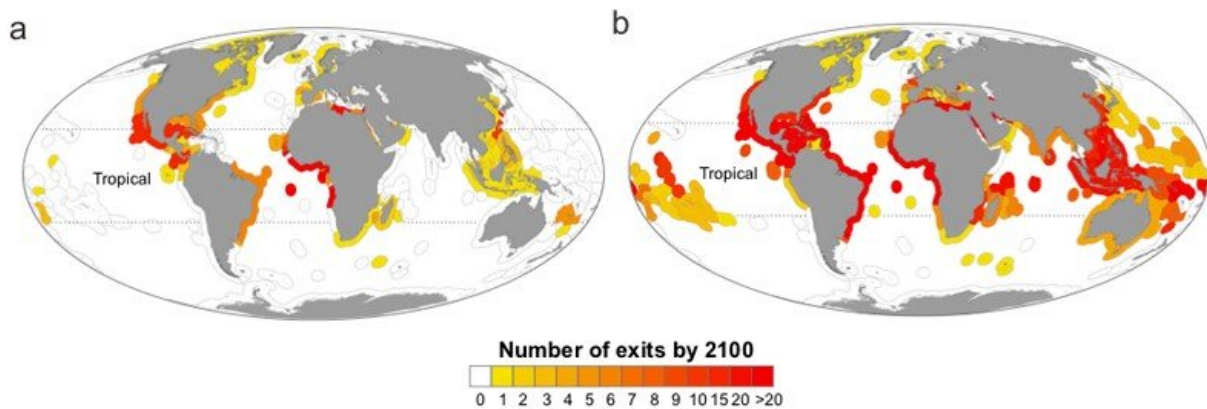


# Researchers examine nations losing fish species due to climate change

February 24 2020, by Adam Thomas



The number of species shifting out of each exclusive economic zone (EEZ) by 2100 under a moderate (left) and more severe (right) greenhouse gas emissions scenario. Credit: University of Delaware

As ocean warming causes fish stocks to migrate toward cooler waters to maintain their preferred thermal environment, many of the nations that rely on commercial fish species as an integral part of their economy could suffer.

A new study published in *Nature Sustainability* from the University of Delaware, the University of California, Santa Barbara and Hokkaido University, shows that nations in the tropics—especially Northwest African nations—are especially vulnerable to this potential species loss

due to [climate change](#). Not only are [tropical countries](#) at risk for the loss of [fish](#) stocks, the study found there are not currently any adequate policy interventions to help mitigate affected countries' potential losses.

Kimberly Oremus, assistant professor in the School of Marine Science and Policy in UD's College of Earth, Ocean and Environment, explained that when the researchers looked at [international agreements](#), including the United Nations Convention on the Law of the Sea, they found no specific text for what happens when fish leave a country's Exclusive Economic Zone (EEZ), a zone established to give a country national jurisdiction over a fishery resource.

That means countries could be vulnerable to economic losses, and those potential losses could make the fish populations themselves vulnerable as well.

"We realized there was an incentive for countries when they lose a fish or anticipate that loss to go ahead and overfish before it leaves because otherwise, they don't get the monetary benefits of the resource," said Oremus.

## **Mapping Species Loss**

The researchers used previously projected changes in the distribution range of 779 commercial fish species to estimate the number of species exiting national jurisdiction under contrasting emissions scenarios up to 2100.

Tropical nations in particular stand to lose the most species because there are few if any stocks to replace those leaving. Under a moderate emissions scenario, the research showed that by the year 2100, the average tropical nation could lose 7 percent of the species that were present in 2012.

"The tropics are predicted to lose more fish species than other regions because fish usually have a temperature range that they're comfortable living in and if it gets too hot, and they have nowhere else to go, they're going to migrate towards the poles," said Oremus.

Northwestern African EEZs could lose the highest percentage of species, with a 6-25% reduction predicted by 2050 and a 30-58% reduction predicted by 2100 under the moderate and most severe scenarios, respectively.

## **Readiness to Address the Problem**

While the exit of stocks from national fisheries is inevitable, carefully designed international cooperation could ease the impact on individual nations while preserving the resource for others.

In addition to looking at the species loss, the researchers examined 127 international fisheries agreements, looking at the large, regional ones as well as smaller bi-lateral agreements. They found that none of the agreements have language that prepares countries for the exits of stock, climate change or range shifts.

"We found that there is no fisheries agreement that is explicitly focused on this issue. None," said co-author James Salzman, a distinguished professor of environmental law at UC Santa Barbara's Bren School of Environmental Science and Management. "There's a gap in international law."

Traditional fisheries management assumes that fish are a renewable natural resource and that so long as their geographic range is static, they will remain plentiful in the absence of overfishing.

But the long-term migration of a [species](#) out of a country due to climate

change means that fish stocks may not always be renewable on the level of a given jurisdiction, even if they remain renewable on an international scale. For the jurisdiction losing the stock, this creates an incentive to overfish before it exits.

Oremus said that policy makers need to think about how those countries could be compensated for the loss of fish stocks due to climate change, which might help prevent countries from overfishing stocks before they exit their EEZs. International agreements regarding climate change have mechanisms to consider compensation for losses, and that policy avenue may work better than the scores of fisheries agreements that Oremus' team found were not set up to wrestle with the question at all.

How to handle liability for loss and damages from climate change—including whether countries that are more developed and have emitted more carbon dioxide should be compensating countries that are less developed—has been an ongoing discussion throughout the annual United Nations' Conference of the Parties (COP) meetings during which countries work to address climate change.

In the most recent COP 25 meeting in Madrid in December, compensation was again discussed, and the meeting highlighted the interplay between climate change and the ocean, but fisheries were not addressed.

"Policy in the tropics really needs to focus on this now," said Salzman. "I think this could shift some of the way the loss and damage debate happens in the climate arena, because fisheries really have been overlooked."

While the Small Island Developing States have so far concentrated on concerns about becoming climate migrants as their land is overtaken by the ocean, Oremus said the study should encourage them and other

tropical nations to bring fisheries into the conversation.

"For many nations where fish are one of the main economic resources driving their gross domestic product, this is something that they'll want to take into account when they join together to try and negotiate [climate agreements](#)," said Oremus.

**More information:** Governance challenges for tropical nations losing fish species due to climate change, *Nature Sustainability* (2020). [DOI: 10.1038/s41893-020-0476-y](#) , [nature.com/articles/s41893-020-0476-y](https://www.nature.com/articles/s41893-020-0476-y)

Provided by University of Delaware

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