A fisherman hauls in a net full of fish while trawling in the English Channel. The rise of industrial fishing has led to the harvesting of wildlife at rates too high for species to replace themselves. Today, over a third of global stocks are overfished, posing a threat to biodiversity a... Read More
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ENVIRONMENT REFERENCE

How overfishing threatens the world's oceans—and why it could end in catastrophe

Decades of harvesting the seas have disrupted the delicate balance of marine ecosystems—despite global efforts to mitigate the damage.

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Scientists have long been sounding the alarm about a looming catastrophe of ocean overfishing—the harvesting of wildlife from the sea at rates too high for species to replace themselves. Yet for two decades, global leaders have been at an impasse in their efforts to reverse the damage that has been done.

Marine scientists know when widespread overfishing of the seas began. And they have a pretty good idea when, if left unaddressed, it will end badly. Here's a look at the critical issues in overfishing—from its effects on biodiversity to the limited successes of mitigation efforts.

The earliest overfishing occurred in the early 1800s when humans, seeking blubber for lamp oil, decimated the whale population around Stellwegen Bank, off the coast of Cape Cod. Some fish consumed in the United States, including Atlantic cod, herring, and California's sardines, were also harvested to the brink of extinction by the mid-1900s. These isolated, regional depletions were highly disruptive to the food chain—which only became more precarious in the late 20th century.

In the mid-20th century, countries around the world worked to build their fishing capacities to ensure the availability and affordability of protein-rich foods. Favorable policies, loans, and subsidies spawned a rapid rise of big industrial fishing operations, which quickly supplanted local fishers as the world's main source of seafood.

These large, profit-seeking commercial fleets were aggressive, scouring the world's oceans and developing ever more sophisticated methods and technologies for finding, extracting, and processing their target species. Consumers soon grew accustomed to having access to a wide selection of fish at affordable prices.

But by 1989, when about 90 million tonnes (metric tons) of fish were taken from the ocean, the industry had hit its high point, and yields have declined or stagnated ever since. Fisheries for the most sought-after species, like orange roughy, Chilean sea bass, and bluefin tuna, have collapsed for lack of fish. In 2003, a scientific report estimated that industrial fishing had reduced the number of large ocean fish to just 10 percent of their pre-industrial population.

Why high seas fishing isn't just destructive—it's unprofitable.

How overfishing affects biodiversity

Faced with the collapse of large-fish populations, commercial fleets began traveling deeper in the ocean and farther down the food chain for viable catches. This so-called "fishing down" has triggered a chain reaction that is upsetting the ancient and delicate balance of the sea's biologic system.

Coral reefs, for example, are particularly vulnerable to overfishing. Plant-eating fish keep these ecosystems in balance by eating algae, keeping the coral clean and healthy so that it can grow. Fishing out too many herbivores—whether intentionally or as bycatch—can weaken reefs and

and climate change. Fishing equipment and debris can also physically destroy the fragile corals that make up the reef foundations.

Overfishing can also harm other marine species. Trawling, a method in which boats pull massive nets behind them in the water, pulls in more than just shrimp and bluefin tuna—it captures just about anything in its path. Sea turtles, dolphins, sea birds, sharks, and other animals have all faced existential threats as bycatch.

Efforts to prevent overfishing

Over the years, as fisheries have caught less and less, humans have begun to understand that the oceans, assumed to be unendingly vast and rich, are in fact highly vulnerable. In 2006, a study of catch data published in the journal *Science* grimly predicted that if such unsustainable fishing rates continue, all the world's fisheries will collapse by 2048.

Many scientists say most fish populations could be restored with aggressive fisheries management and better enforcement of laws governing catches, including instituting catch limits. An increased use of aquaculture, the farming of seafood, would also help. And in many regions, there is reason for hope.

The United Nations Food and Agriculture Organization (FAO)—which lays out international standards for fisheries management—pointed out in its 2020 report that there has been a slight increase in the percentage of stocks that are sustainably producing the most food possible, which is the goal of fisheries management.

Still, many challenges remain. About a third of global stocks are overfished—and the overall proportion of fish stocks at sustainable levels has continued to decline. The FAO report says this deterioration of fish stocks can particularly be seen “in places where fisheries management is not in place, or is ineffective.” Of the areas the organization monitors, the Mediterranean and Black Sea had the highest percentage of stocks—62.5 percent—fished at unsustainable levels.

Can we stop overfishing?

Government subsidies to the fishing industry remain a significant challenge to reversing this troubling trend. One global survey found that in 2018 nations spent $22 billion on so-called harmful subsidies that fuel

As *National Geographic* reported at the time, harmful subsidies are those that fund practices that would not otherwise be profitable, such as for industrial trawlers' fuel costs. China, for example, has increased its harmful subsidies by 105 percent over the past decade.

World Trade Organization members have been discussing how to limit these subsidies since 2001—with little progress. And despite a pledge by members of the United Nations to forge an agreement by 2020, that deadline has passed with no resolution.

In 2021, WTO Director-General Ngozi Okonjo-Iweala called on members to reach an agreement, arguing that a "failure to do so would jeopardize the ocean's biodiversity and the sustainability of the fish stocks on which so many depend for food and income."

It's unclear whether countries will muster the political will to follow through. But what is clear to scientists is that it is one of many measures that's critical to saving the world's oceans.

Editor's note: *This story was originally published on April 27, 2010. It has been updated.*

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