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Earth & Space

Fish & Ships

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ABSTRACT

How far has your dinner travelled to get to your plate? If it's a piece of fish, then the answer might surprise you.

Fishing Trawler Antares Image credits: Ronnie Robertson – CC BY-SA 2.0

Three billion people depend on seafood as their primary protein, with hundreds of millions directly employed in fisheries worldwide. Research by the *Sea Around Us*, building on national data submitted to the United Nations but correcting for small-scale fisheries, discarded catches, recreational fishing, and under- and overreporting, shows that global catches grew strongly between 1950 and 1996, but have now been declining for two decades. Global bodies, including the FAO and the World Bank recognise that such overfishing gravely threatens the future of fisheries livelihoods and seafood security.

We were interested in what drove the initial rise and subsequent fall in catches. Why had warning signs from local collapses in fish populations not triggered reductions in fishing effort, when we are now catching fewer and fewer fish per boat and hour at sea? The answer, we suspected, might lie in the way that fisheries have been able to exploit the global oceans.

Unlike agriculture or mining, which are land-based and so relatively easy to observe and police, fishing is a highly mobile industry, sometimes operating far from official scrutiny. Additionally, while a farmer who depletes his soil has to live with consequences, mobile industrial fleets can move on to fresh fishing grounds when catches decline, a pattern seen in the 'boom and bust' trawling of seamounts for slow growing deep-water species such as orange roughy*.

To visualise the expansion of fisheries, we used the *Sea Around Us* allocation of catches to a global grid of ½° map cells as a starting point. For each of the 200 fishing countries in the data, we summed the total catches taken by their fleets in each cell in each year. We then calculated the distance from each

catch cell to the nearest home port of that country, using the World Ports Index. Combined, the catch and distance figures allowed us to calculate the average distance travelled by each country's fleet to catch a ton of fish every year since 1950.

The results are staggering. Overall, the average distance travelled to fish has more than doubled since 1950, from 500 to 1250 km, with countries moving further and further from shore to find catches, spending more time and burning more fuel. Currently, we estimate that over 90% of the ocean's surface is fished to some extent, up from 60% in 1950. This expansion showed three distinct phases. In the 1950s and 1960s, total catch and area fished both expanded strongly. From 1970 to 1996, catches continued to grow but the area fished plateaued. Finally, since 1996 catches began a steady decline despite a slight expansion in fished area. This suggests that from 1950 we rapidly expanded into the world's remaining fishing grounds, exploited them at an increasing rate, and finally, exceeded their productive limits.

Just four countries are responsible for the majority of this spatial expansion. China, Taiwan, South Korea and Spain increased their average fishing distance by 2,000-4,000 km over a 65-year period, cementing their dominance as 'distant water' fishing nations. While high seas fishing contributes to this trend, much of their expansion has been into the fishing grounds of other countries, particularly in Africa, South America and the Pacific Islands. A concurrent study by Doug McCauley and colleagues found that these four countries, plus Japan, dominate the fishing effort in lower income countries, rarely to the benefit of the host nation.

The most expansive countries also provide the largest 'harmful' subsidies for fuel and vessels: Taiwan's industrial fisheries, for example, receive subsidies equivalent to 80% of the landed value of their catch. Fishing in this way is increasingly uneconomic, with over half of high seas fishing unprofitable without subsidies, and vessel operators even turning to slavery to keep operating. Economists argue that reducing high seas fishing by eliminating subsidies for fuel and closing some areas to fleets, and better regulation of distant water fishing in general, could benefit coastal nations by increasing the productivity and value of their domestic fisheries, boosting equity and food security.

Both subsidies and improved high seas management are currently in the sights of policymakers. The Sustainable Development Goals set a target of eliminating harmful fisheries subsidies by 2020, and UN members recently began negotiations on a new 'High Seas Treaty' to regulate biodiversity beyond national borders. Achieving agreement on these two fronts will require a level of coordination between governments that has so far eluded them, but governments can begin to implement policies domestically that will shore up the future of their own fisheries. Industrial fishing continues to play an important role in global seafood production, but our research suggests that the distance travelled to fish does not always make economic or ecological sense, leading to negative outcomes for equity among fishing countries. Better regulation, an end to distorting subsidies, and the rebuilding of over exploited coastal ecosystems are required to ensure that food security and livelihoods from fishing are secured into the future.

** Interesting fact: The orange roughy was originally called the 'slimehead', but was renamed by US fisheries in the 1970s to make it more marketable!*