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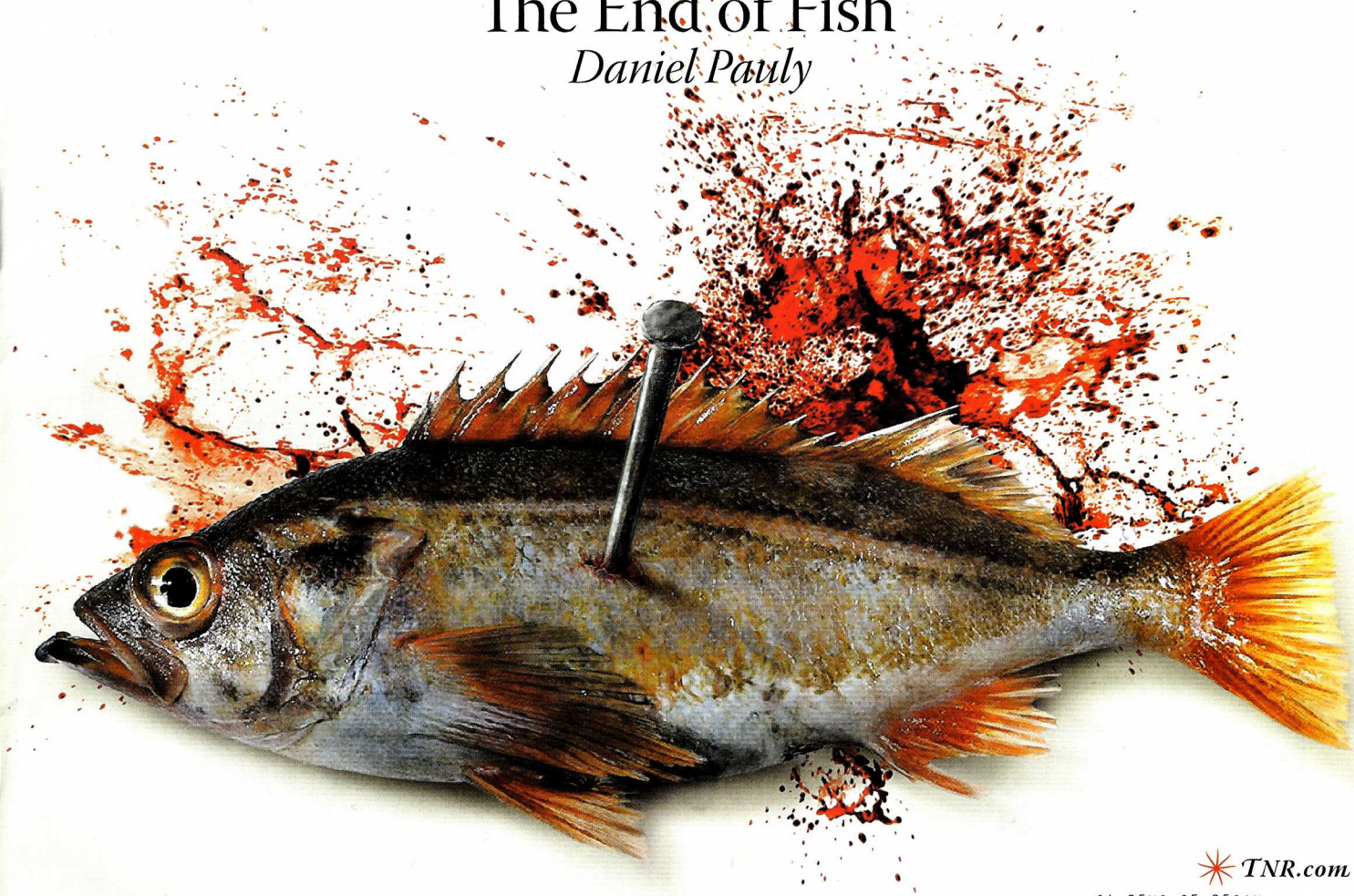
THE ENVIRONMENT ISSUE

AQUACALYPSE NOW

The End of Fish

Daniel Pauly



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Aquacalypse Now

The end of fish.

DANIEL PAULY

OUR OCEANS HAVE BEEN the victims of a giant Ponzi scheme, waged with Bernie Madoff–like callousness by the world's fisheries. Beginning in the 1950s, as their operations became increasingly industrialized—with onboard refrigeration, acoustic fish-finders, and, later, GPS—they first depleted stocks of cod, hake, flounder, sole, and halibut in the Northern Hemisphere. As those stocks disappeared, the fleets moved southward, to the coasts of developing nations and, ultimately, all the way to the shores of Antarctica, searching for icefishes and rockcods, and, more recently, for small, shrimplike krill. As the bounty of coastal waters dropped, fisheries moved further offshore, to deeper waters. And, finally, as the larger fish began to disappear, boats began to catch fish that were smaller and uglier—fish never before considered fit for human consumption. Many were renamed so that they could be marketed: The suspicious slimehead became the delicious orange roughy, while the worrisome Patagonian toothfish became the wholesome Chilean seabass. Others, like the homely hoki, were cut up so they could be sold sight-unseen as fish sticks and filets in fast-food restaurants and the frozen-food aisle.

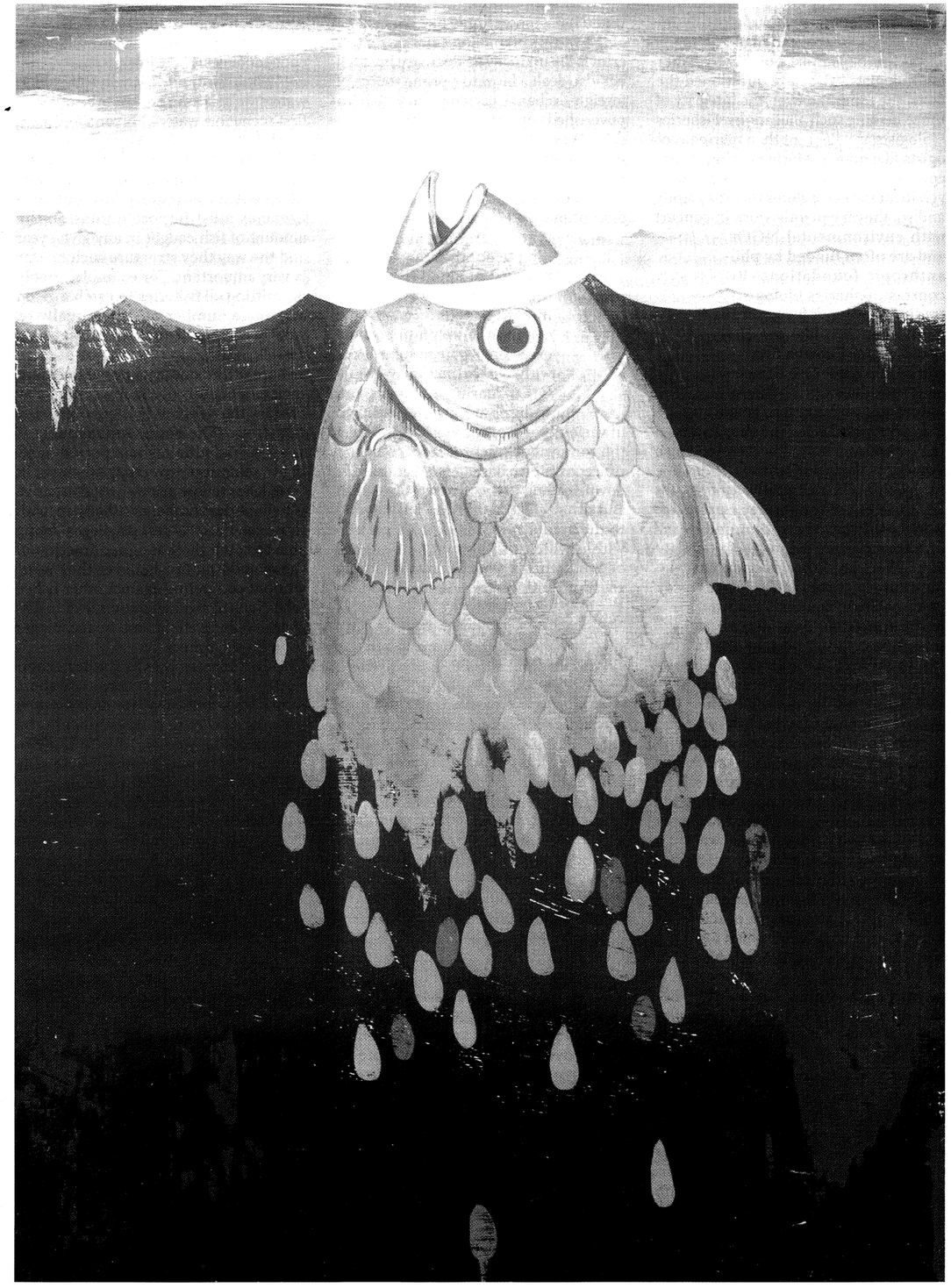
The scheme was carried out by nothing less than a fishing-industrial complex—an alliance of corporate fishing fleets, lobbyists, parliamentary representatives, and fisheries economists. By hiding behind the romantic image of the small-scale, independent fisherman, they secured political influence and government subsidies far in excess of what would be expected, given their minuscule contribution to the GDP of advanced economies—in the United States, even less than that of the hair salon industry. In Japan, for example, huge, vertically integrated conglomerates, such as Taiyo or the better-known Mitsubishi, lobby their friends in the Japanese Fisheries Agency and the Ministry of Foreign Affairs to help them gain access to the few remaining plentiful stocks of tuna, like those in the waters surrounding South Pacific countries. Beginning in the early 1980s, the United States, which had not traditionally been much of a fishing country, began heavily subsidizing U.S. fleets, producing its own fishing-industrial complex, dominated by large processors and retail chains. Today, governments provide nearly $30 billion in subsidies each year—about one-third of the value of the global catch—that keep fisheries going, even when they have overexploited their resource base. As a result, there are between two and four times as many boats as the annual catch requires, and yet, the funds to "build capacity" keep coming.

The jig, however, is nearly up. In 1950, the newly constituted Food and Agriculture Organization (FAO) of the United Nations estimated that, globally, we were catching about 20 million metric tons of fish (cod, mackerel, tuna, etc.) and invertebrates (lobster, squid, clams, etc.). That catch peaked at 90 million tons per year in the late 1980s, and it has been declining ever since. Much like Madoff's infamous operation, which required a constant influx of new investments to generate "revenue" for past investors, the global fishing-industrial complex has required a constant influx of new stocks to continue operation. Instead of restricting its catches so that fish can reproduce and maintain their populations, the industry has simply fished until a stock is depleted and then moved on to new or deeper waters, and to smaller and stranger fish. And, just as a Ponzi scheme will collapse once the pool of potential investors has been drained, so too will the fishing industry collapse as the oceans are drained of life.

Unfortunately, it is not just the future of the fishing industry that is at stake, but also the continued health of the world's largest ecosystem. While the climate crisis gathers front-page attention on a regular basis, people—even those who profess great environmental consciousness—continue to eat fish as if it were a sustainable practice. But eating a tuna roll at a sushi restaurant should be considered no more environmentally benign than driving a Hummer or harpooning a manatee. In the past 50 years, we have reduced the populations of large commercial fish, such as bluefin tuna, cod, and other favorites, by a staggering 90 percent. One study, published in the prestigious journal *Science*, forecast that, by 2048, *all* commercial fish stocks will have "collapsed," meaning that they will be generating 10 percent or less of their peak catches. Whether or not that particular year, or even decade, is correct, one thing is clear: Fish are in dire peril, and, if they are, then so are we.

THE EXTENT OF THE fisheries' Ponzi scheme eluded government scientists for many years. They had long studied the health of fish populations, of course, but typically, laboratories would focus only on the species in their nation's waters. And those studying a particular species in one country would communicate only with those studying that same species in another. Thus, they failed to notice an important pattern: Popular species were sequentially replacing each other in the catches that fisheries were reporting, and, when a species faded, scientific attention shifted to the replacement species. At any given moment, scientists might acknowledge that one-half or two-thirds of fisheries were being overfished, but, when the stock of a particular fish was used up, it was simply removed from the denominator of the fraction. For example, the Hudson River sturgeon wasn't counted as an overfished stock once it disappeared from New York waters; it simply became an anecdote in the historical record. The baselines just kept shifting, allowing us to continue blithely damaging marine ecosystems.

It was not until the 1990s that a series of high-profile scientific papers demonstrated that we needed to study, and mitigate, fish depletions at the global level. They showed that phenomena previously observed at local levels—for example, the disappearance of large species from fisheries' catches and their replacement by smaller species—were also occurring globally. It was a realization akin to understanding that the financial meltdown was due not to the failure of a single bank, but, rather, to the failure of the entire banking system—and it drew a lot of controversy.



MATT BANDSUCH

The notion that fish are globally imperiled has been challenged in many ways—perhaps most notably by fisheries biologists, who have questioned the facts, the tone, and even the integrity of those making such allegations. Fisheries biologists are different than marine ecologists like myself. Marine ecologists are concerned mainly with threats to the diversity of the ecosystems that they study, and so, they frequently work in concert with environmental NGOs and are often funded by philanthropic foundations. By contrast, fisheries biologists traditionally work for government agencies, like the National Marine Fisheries Service at the Commerce Department, or as consultants to the fishing industry, and their chief goal is to protect fisheries and the fishermen they employ. I myself was trained as a fisheries biologist in Germany, and, while they would dispute this, the agencies for which many of my former classmates work clearly have been captured by the industry they are supposed to regulate. Thus, there are fisheries scientists who, for example, write that cod have "recovered" or even "doubled" their numbers when, in fact, they have increased merely from 1 percent to 2 percent of their original abundance in the 1950s.

Yet, despite their different interests and priorities—and despite their disagreements on the "end of fish"—marine ecologists and fisheries scientists both want there to be more fish in the oceans. Partly, this is because both are scientists, who are expected to concede when confronted with strong evidence. And, in the case of fisheries, as with global warming, the evidence is overwhelming: Stocks are declining in most parts of the world. And, ultimately, the important rift is not between these two groups of scientists, but between the public, which owns the sea's resources, and the fishing-industrial complex, which needs fresh capital for its Ponzi scheme. The difficulty lies in forcing the fishing-industrial complex to catch fewer fish so that populations can rebuild.

It is essential that we do so as quickly as possible because the consequences of an end to fish are frightful. To some Western nations, an end to fish might simply seem like a culinary catastrophe, but for 400 million people in developing nations, particularly in poor African and South Asian countries, fish are the main source of animal protein. What's more, fisheries are a major source of livelihood for hundreds of million of people. A recent World Bank report found that the income of the world's 30 million small-scale fisheries is shrinking. The decrease in catch has also dealt a blow to a prime source of foreign-exchange earnings, on which impoverished countries, ranging from Senegal in West Africa to the Solomon Islands in the South Pacific, rely to support their imports of staples such as rice.

And, of course, the end of fish would disrupt marine ecosystems to an extent that we are only now beginning to appreciate. Thus, the removal of small fish in the Mediterranean to fatten bluefin tuna in pens is causing the "common" dolphin to become exceedingly rare in some areas, with local extinction probable. Other marine mammals and seabirds are similarly affected in various parts of the world. Moreover, the removal of top predators from marine ecosystems has effects that cascade down, leading to the increase of jellyfish and other gelatinous zooplankton and to the gradual erosion of the food web within which fish populations are embedded. This is what happened off the coast of southwestern Africa, where an upwelling ecosystem similar to that off California, previously dominated by fish such as hake and sardines, has become overrun by millions of tons of jellyfish.

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Jellyfish population outbursts are also becoming more frequent in the northern Gulf of Mexico, where the fertilizer-laden runoff from the Mississippi River fuels uncontrolled algae blooms. The dead algae then fall to a sea bottom from which shrimp trawling has raked all animals capable of feeding on them, and so they rot, causing Massachusetts-sized "dead zones." Similar phenomena—which only jellyfish seem to enjoy—are occurring throughout the world, from the Baltic Sea to the Chesapeake Bay, and from the Black Sea in southeastern Europe to the Bohai Sea in northeastern China. Our oceans, having nourished us since the beginning of the human species some 150,000 years ago, are now turning against us, becoming angry opponents.

That dynamic will only grow more antagonistic as the oceans become warmer and more acidic because of climate change. Fish are expected to suffer mightily from global warming, making it essential that we preserve as great a number of fish and of fish species as possible, so that those which are able to adapt are around to evolve and propagate the next incarnations of marine life. In fact, new evidence tentatively suggests that large quantities of fish biomass could actually help attenuate ocean acidification. In other words, fish could help save us from the worst consequences of our own folly—yet we are killing them off. The jellyfish-ridden waters we're seeing now may be only the first scene in a watery horror show.

To halt this slide toward a marine dystopia, government intervention is required. Regulatory agencies must impose quotas on the amount of fish caught in any given year, and the way they structure such quotas is very important. For example, simply permitting all fisheries to catch a given aggregate number of fish annually results in a wasteful build-up of fleets and vessels as fisheries race to grab as large a share of the quota as possible before their competitors do. Such a system may protect the fish, but it is economically disastrous: The entire annual quota is usually landed in a short period, leading to temporary oversupply, which, in turn, leads to low prices. The alternative is to limit the number of fishermen, with those retaining "access privileges" being able to catch their assigned fraction of the overall quota whenever they want, without competing against other fishermen. Such individual quotas lead to less overall fishing effort and, hence, bigger profit in the fishery.

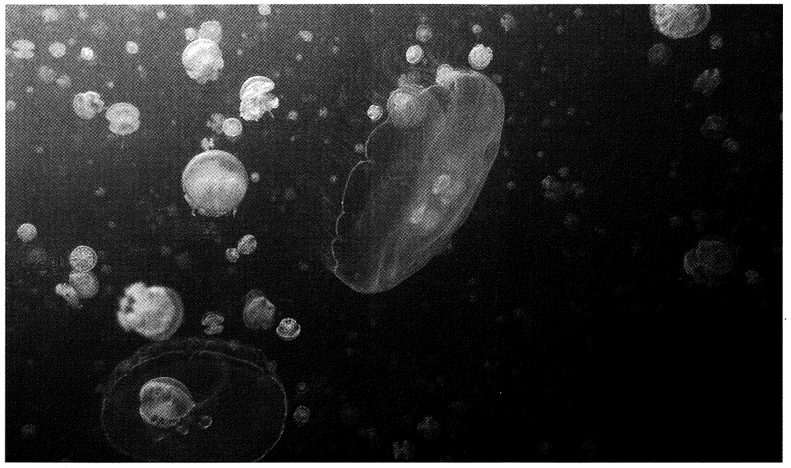
Unfortunately, most fisheries economists, fixated solely on corporate short-term profits, argue that, for such a system to work, access privileges must *(a)* be handed out for free, *(b)* be held in perpetuity, and *(c)* be transferrable (i.e., sellable and buyable like any other commodity). They call this construct "fishing rights" or "individual transferable quotas." However, there is no reason why a government should not auction off quotas with access privileges. The highest bidder would secure the right to a certain percentage of the quota, with society as a whole benefiting from providing private access to a public resource. This would be similar to ranchers paying—as they do—for the privilege to graze their cattle on federal lands. Grazing "rights" on the other hand, would simply give ownership of public land to ranchers, which is something few would consider.

Some Pollyannas believe that aquaculture, or fish farming, can ensure the health of stocks without government action—a notion supposedly buttressed by FAO statistics showing such rapid growth in aquaculture that more than 40 percent of all "seafood" consumed now comes from farms. The problem with this argument is that China reports about 68 percent of the world's aquaculture production, and the FAO, which has been burned by inflated Chinese statistics before, expresses doubt about its stated production and growth rates. Outside of China—where most farmed fish are freshwater vegetarians, such as carp—aquaculture produces predominately carnivorous marine fish, like salmon, which are fed not only vegetal ingredients, but also fishmeal and fish oil, which are obtained by grinding up herring, mackerel, and sardines caught by "reduction fisheries." Carnivore farming, which requires three to four pounds of smaller fish to produce one pound of a larger one, thus robs Peter to pay Paul. Aquaculture in the West produces a luxury product in global terms. To expect aquaculture to ensure that fish remain available—or, at least, to expect carnivore farming to solve the problem posed by diminishing catches from fisheries—would be akin to expecting that Enzo Ferrari's cars can solve gridlock in Los Angeles.

Others believe that fish populations can be rebuilt through consumer awareness campaigns that encourage buyers to make prudent choices. One such approach is to label seafood from fisheries deemed sustainable. In Europe, for example, consumers can look for the logo of the Marine Stewardship Council (MSC), a nonprofit started by the World Wildlife Fund and Unilever, which has a large fish-trading division. At first, the MSC certified only small-scale fisheries, but lately, it has given its seal of approval to large, controversial companies. Indeed, it has begun to measure its success by the percentage of the world catch that it certifies. Encouraged by a Walton Foundation grant and Wal-Mart's goal of selling only certified fish, the MSC is actually considering certifying reduction fisheries, with the consequence that Wal-Mart, for example, will be able to sell farmed salmon shining with the ersatz glow of sustainability. (Given the devastating pollution, diseases, and parasite infestations that have plagued salmon farms in Chile, Canada, and other countries, this "Wal-Mart strategy" will, in the long term, make the MSC complicit to a giant scam.)

The other market-based initiative, prevalent in the United States, distributes wallet-size cards designed to steer consumers toward fish that the group issuing the cards deems to have been caught sustainably. Their success is considerable if measured by the millions of cards given away, for example, by the Monterey Bay Aquarium, but assessing the impact on the fisheries is difficult. For one thing, the multitude of such cards leads to contradictions and confusion, as the same fish are assessed differently by different organizations. For example, ahi tuna is rated as "safe," "questionable," and "avoid" on the wallet cards issued by three U.S. nonprofits. A bigger issue, however, is that these cards generate only "horizontal" pressure—that is, a group of restaurant-goers might chide each other for ordering the cod filet or might ask the overworked student who served them where the fish came from, but this pressure does not reach wholesalers, fleet operators, or supermarket chains. "Vertical" pressure exerted by environmental NGOs on such decision-makers is far more effective. But, if that's true, why not directly pressure the government and legislators, since they are the ones who regulate the fisheries?

Our oceans have been the victims of a giant Ponzi scheme.



MICHAEL DAWSON/REUTERS/LANDOV

Jellyfish populations are exploding in marine ecosystems severely disrupted by the decline of fish.

The truth is that governments are the only entities that can prevent the end of fish. For one thing, once freed from their allegiance to the fishing-industrial complex, they are the ones with the research infrastructure capable of prudently managing fisheries. For another, it is they who provide the billions of dollars in annual subsidies that allow the fisheries to persist despite the lousy economics of the industry. Reducing these subsidies would allow fish populations to rebuild, and nearly all fisheries scientists agree that the billions of dollars in harmful, capacity-enhancing subsidies must be phased out. Finally, only governments can zone the marine environment, identifying certain areas where fishing will be tolerated and others where it will not. In fact, all maritime countries will have to regulate their exclusive economic zones (the 200-mile boundary areas established by the U.N. Law of the Sea Treaty within which a nation has the sole right to fish). The United States has the largest exclusive economic zone in the world, and it has taken important first steps in protecting its resources, notably in the northwest Hawaiian islands. Creating, or re-creating, un-fished areas within which fish populations can regenerate is the only opportunity we have to repair the damage done to them.

There is no need for an end to fish, or to fishing for that matter. But there is an urgent need for governments to free themselves from the fishing-industrial complex and its Ponzi scheme, to stop subsidizing the fishing-industrial complex and awarding it fishing rights, when it should in fact pay for the privilege to fish. If we can do this, then we will have fish forever. ◆

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