

4 “Modern” industrial fisheries and the crisis of overfishing

Becky Mansfield

Until late in the twentieth century, many people thought that the world's oceans were so big and fish so numerous that human activity could never have any substantial impact. What is clear now is that people have profoundly affected the world's oceans both directly and indirectly. This chapter focuses on how people's efforts to capture fish and shellfish have caused rapid declines all over the world in the abundance of many species and in the mix of species. For example, fisheries scientists recently estimated that over the past 50 years the global biomass of large predatory fish – such as tuna and swordfish – has declined by 90 percent, and that the diversity of these fish has declined 10–50 percent (Myers and Worm 2003; Worm *et al.* 2005). The decline of fish populations is often particularly hard on poor coastal communities – in both the global North and South – where many people depend on fishing (and fishing related industries, such as boat building and fish processing) for food and employment. The crisis of overfishing, then, has both environmental and socio-economic dimensions: overfishing is a problem for fish, their ecosystems, and people that depend on them.

After defining overfishing, the heart of the chapter explains why overfishing happens, arguing that it is caused by industrialization of fisheries for economic development. While every case is somewhat different – the decline of Pacific salmon is different from the decline of Atlantic cod, for example (Weber 2002) – it is clear that the main cause of overfishing is the rapid growth of fishing and seafood processing since World War II. The chapter discusses five features of the industrialization of fisheries. First is the huge scale of much fishing today: large vessels, staggering nets and fishing lines, advanced fish-finding technology, and very large seafood firms. Second, there are now global commodity chains that provide relatively wealthy consumers of the global North with a vast array of fresh fish. Third, government policies have *encouraged* industrialization of fisheries, in the name of economic development and modernization. From the US to Ghana to the World Bank, individual governments and intergovernmental agencies have not only treated fish primarily as economic resources, but have urged fishers to catch and sell more fish, and enticed them to do so with financial incentives, technical assistance, and the like. Fourth, industrial fisheries have tended to displace small-scale and artisanal fisheries, which tend to be more equitable and environmental friendly. Fifth is that, as a capital-intensive industry, the fish industry faces

an inherent “contradiction” that arises because firms depend on the environment to provide necessary resources (the fish!), but – especially with competitive pressures to reduce costs – they actively avoid paying the full costs of protecting the environment on which they depend. In sum, harmful industrial fishing is the purposeful outcome of ongoing efforts to foster a western, capitalist model of development, and this capitalist model of development brings with it new pressures to continue to expand fishing effort even if this leads to degrading the very resource on which the industry depends.

The chapter also shows that the dominant explanation for overfishing is misleading and, in fact, is part of the problem, because it encourages further industrialization as the solution. The dominant explanation pivots on the seemingly apolitical idea of “the tragedy of the commons,” which suggests that degradation in fisheries is inevitable as long as fisheries are treated as a “commons” rather than as private property, because in a commons no one has the incentive to conserve. This explanation ignores a host of important features of contemporary fisheries, including the vast differences between small-scale and industrial fishing, the many examples of successful management of fishing commons, and the numerous factors that influence fishing decisions. These factors indicate that individual rationality in specific property regimes is not the underlying problem. Policies based on this dominant explanation encourage capital-intensive fisheries (as opposed to labor-intensive ones), consolidated among fewer and fewer firms – in the name of efficiency, modern economic development, and market incentives. In other words, policies based on the dominant explanation tend to encourage increased industrialization of fisheries. Therefore, these policies are part of the problem – for both ocean ecosystems and poor people – not the solution. This also shows that even while dominant explanations appear apolitical, they are highly political, in that they lend support to certain outcomes and groups of people over others.

Global overfishing: definitions and evidence

What is overfishing, and what evidence shows that it exists? For this chapter, the term “overfishing” refers to a situation in which fishing substantially reduces the abundance of a population of fish; this then causes a variety of broader ecological and socio-economic changes. Fishing can reduce a population not just by killing many fish, but by reducing the abundance of breeding adults, so that they are unable to reproduce quickly enough to replenish the population. Overfishing can lead to changes in a local or regional ecosystem; for example when predatory fish are removed, smaller herbivorous fish may increase in abundance, restructuring the entire food web and making recovery of the predatory species less likely (Frank *et al.* 2005). Overfishing of some species can also reduce marine biodiversity, which undermines the resilience of marine ecosystems and can lead to collapse of additional fish populations (Worm *et al.* 2006). All of these biological and ecological changes have socio-economic dimensions as well; for example, it may take more effort (time, technology) to catch the same quantity of fish, fish may become more expensive, or desired fish may no longer be available.

One set of evidence for overfishing is the collapse of a variety of individual fisheries around the world. Such “crashes” occur when catch levels in a fishery decline due to changes in the abundance of the fish (rather than because people stopped trying to catch them); in other words, crashes occur when fishing is halted or dramatically reduced because there is no longer enough fish to sustain catch at previous levels. One of the most well-known examples is the collapse of the cod fisheries on the Georges and Grand Banks in the Atlantic Ocean off the coasts of Canada and the United States (Kurlansky 1997; Pauly and Maclean 2003; Weber 2002). Atlantic cod are infamous for their former abundance – so thick early colonists claimed they blocked ships – but in the late 1980s and early 1990s, these fisheries were declared severely overfished and were closed by both the US and Canadian governments. Closure of the Grand Banks fishery was especially devastating in Newfoundland, where 30,000 people were put out of work all at once in 1992. These fisheries have not recovered – even as some fishers (at the urging of local and national governments) have moved on to fish for other species, such as monkfish (a deep sea fish), that were formerly undesirable but now are themselves overfished. It is important to note that crashes such as that in the cod fishery suggest that overfishing had been occurring for a long time. In the short to medium term, overfishing can be masked by increased effort or improved fish finding technology that allow fishing to continue even as abundance of fish plummets.

Information about global fisheries suggests that overfishing is not just a series of isolated events, but is quite widespread. The Food and Agriculture Organization of the United Nations (FAO) is the main intergovernmental organization that collects information on fisheries and provides fishery development assistance around the world. The FAO now concludes that almost *one third* of fish stocks today are overfished (the FAO refers to them as overexploited, depleted, or recovering), while half of fish stocks are fully exploited, meaning that any expansion would lead to overfishing (FAO 2008b). In other words, all told, 80 percent of fish stocks globally are fully or over exploited. Fisheries researchers have also noted the extent to which fishing activity has expanded spatially in the past fifty years. Fisheries for large ocean-going predators (e.g. tuna, billfish) covered most of the oceans by the 1980s (leading to the reductions noted in the chapter’s introduction), and fisheries that target bottom-dwelling fish (e.g. cods, flatfish, lobster) now cover the world’s continental shelves to a depth of 200 meters (Myers and Worm 2003; Pauly *et al.* 2003; Worm *et al.* 2005).

This information indicates the extent of the overfishing problem, and the limited options for a quick economic fix. Were overfishing limited to a few isolated cases, these would be localized ecological and socio-economic tragedies of environmental degradation and local hardship. For the fishing industry overall – and especially larger, more mobile firms – such localized problems would not constitute a larger crisis, for they could simply move on to other places and other species. What current data suggest, however, is that this is no longer possible. Fisheries that are not already overfished are fully exploited; the global fishing industry has already moved from place to place and from species to species. This situation is reflected in FAO information regarding global fish production, which shows that today people

globally produce around 140 million metric tons (over 300 billion pounds) of seafood a year – seven times as much as they did in 1950, when total global production was just 20 million metric tons; further, total production continues to climb every year (FAO 2008b). This information might seem to suggest that, in fact, fisheries are quite healthy: they are large and still growing. What these aggregate numbers mask, however, is that after rising for decades, the global fish *catch* leveled off in the late 1980s and early 1990s, at around 90–95 million metric tons per year (FAO 1998, 2000, 2008b). Capture fisheries are not growing – although, in aggregate, neither have they declined.

The remainder of global production – and all growth in production – comes from aquaculture (also known as fish farming) in which fish are raised instead of captured. Aquaculture is now the fastest growing animal food sector in the world, growing at an annual rate of almost 7 percent since 1970, so that now aquaculture provides more than a third of total volume of fish (and almost a half of fish produced for human consumption) (FAO 2008b). Farming fish represents a potential fix for fish firms looking for a way out of the crisis of overfishing – yet it is important to note that aquaculture also *contributes* to the crisis in a variety of ways (Mansfield forthcoming). For example, intensive aquaculture depends on wild fisheries to provide feed for farmed fish. It may destroy or pollute local habitats, and it drives down prices for key species such as salmon and shrimp (thus deepening the crisis for fishers trying to make a living on the wild versions of these species), and in some cases it introduces new chemicals into fish that may be harmful to human health. It seems then, that while aquaculture is becoming increasingly important in the global seafood business, it is not in itself a solution to widespread problems in fisheries.

Explaining overfishing: industrialization of fisheries for modern economic development

Today's crisis of overfishing is caused by industrialization of fisheries, since the 1950s, as an engine for capitalist economic development. This section discusses five features of industrialization that together explain why overfishing is happening on the scale it is today: first, the massive scale of fisheries today, second, the flow of fish from South to North, third, government policies for modernizing fisheries, fourth, the threat industrial fisheries pose to small-scale fisheries, and fifth, pressures to overfish faced by capitalist, industrial fishing.

Big boats and big business

One of the most striking features of contemporary fisheries is the staggering size and sophistication of available technology. It is this industrial revolution that fueled the incredible growth in the global catch of fisheries from the 1950s to the 1980s – when, as discussed above, catch leveled off. While the FAO (2008b) defines as “industrial” any fishing vessel over about 24 meters (75 feet) in length, a vessel that size would appear small compared to the largest vessels, which are over 130

meters (400 feet) long and can stay at sea for over a year (FAO 2008a). There is a variety of industrial fishing methods, including trawling (using a long net pulled behind a vessel), purse-seining (using a net to surround a school of fish), and longlines (fishing lines up to tens of kilometers long with thousands of hooks) (FAO 2009). Iconic of industrialization are the factory vessels that not only capture fish but have processing facilities on board. These factory vessels were invented in the early 1950s by European countries (led by the United Kingdom) as part of a strategy of development for war recovery (Standal 2008). These vessels were widely adopted in the 1960s by many major fishing nation-states, such as Norway, Japan, and the Soviet Union, and in the 1970s by the United States. Today industrial vessels (as defined by the FAO) are found in countries of all regions of the world, though they comprise a higher proportion of the vessels in Europe, North America, and Latin America than in Asia or Africa (FAO 2008b). Further, industrial vessels are only possible because of a range of other technological developments, including advanced refrigeration, hydraulic machinery to haul gigantic nets and lines, and fish-finding technologies such as sonar and satellite guidance systems (FAO 2008a).

Another key dimension of industrialization is that seafood – fishing, processing, marketing, etc. – is now big business. This is true not just because of the volume of fish that is caught, or its total value, which is over US\$90 billion (FAO 2008b). It is also true because a few, large fishing firms from countries such as Japan, Russia, Norway, Thailand, and the United States dominate the world of commercial seafood. For example, the world's largest fishery for human consumption is that for Alaska pollock, which is found across the northern Pacific Ocean (other fisheries are for fish meal and oil used in animal feed and fertilizer). Annual catch of Alaska pollock is close to 3 million tons (FAO 2008b), about half of which is caught in US waters off Alaska (NMFS 2007). This entire amount, around 1.5 million tons, is caught by about 120 vessels, including 21 factory trawlers owned by just five firms (e.g. Trident Seafood); the other 100 vessels deliver their catch to just eight onshore processors, which are largely owned either by the same companies that own the factory trawlers or by large Japanese fish firms (e.g. UniSea, which is owned by Nippon Suisan Kaisha) (NMFS 2009; Mansfield 2004b). This fish is then used in a variety of industrial preparations – you will almost never see pollock on the menu as itself. Instead, pollock is one of the main species used in the fish sticks and fried fish fillets that are ubiquitous in grocery store freezer aisles and fast food restaurants; pollock is also one of the main species used in “surimi,” a fish paste used to make imitation crab legs and other imitation products (Mansfield 2003). In other words, pollock is very much an industrial product: it is caught in vast quantities by a small number of vessels owned by very large firms, and it is mass-produced and sold by large food chains.

Consumption in the global north

Part of what makes seafood so profitable for these large firms is that fish are world travelers: much of the fish caught in industrial fisheries is consumed not by the poor, but by relatively wealthy consumers of the global North. The volume of

seafood traded internationally is large and growing – and the majority of it is ending up in North America, Japan, and the European Union. Almost 40 percent of seafood production, worth almost US\$90 billion, enters into international trade (data in this paragraph from FAO 2008b). Even adjusted for inflation, this is more than double the volume and value of seafood traded twenty years earlier, in the mid-1980s. The top ten exporting (producing) countries include countries from the global North and South, while in contrast, the top ten importers (consumers) are all in the North except for China – which imports many fish to process and re-export them to the North. Looking beyond these “top ten,” in terms of value about 75 percent of fish exports from the South are destined for the North, and about 80 percent of imports in the North are from the South; indeed, Japan, the USA, and the EU account for 72 percent of total import value. In addition, the South provides 70 percent of world exports of non-food fish – that is, the fish meal and oil that are used in animal feed (for farmed fish, livestock, pets) and fertilizer.

What all this means is that seafood is coming to be like many other products from timber to toys: it is produced in the South and consumed in the North. It remains true that fish is an important source of protein for poor people in coastal communities around the world; for example, recent estimates suggest that fish provides about 20 percent of protein in developing countries (Béné *et al.* 2007). But these data on trade contradict common claims that demand for fish is driven by “population growth” (e.g. FAO 2008b: 164), which locates the problem in the global South (where the populations of many countries are still rising). Rather, the flow of fish from the South to the North contains a simple lesson: blame for overfishing cannot be divided equally among all people or all places. Just as it is important to understand differences between industrial and small scale fisheries, it is important to understand differences in who benefits from industrial fishing. A disproportionate share of the world’s fish catch is ultimately destined for wealthy countries of the global North.

Industrial fisheries = “modern economic development”

Explaining the rise of industrial fishing is impossible without understanding the role of fisheries development policy. While industrialization might seem to be the inevitable outcome of a seemingly natural process of economic development, in fact industrialization had to be both envisioned and fostered. Fisheries have been targeted by both national and international governmental bodies (e.g. the FAO, World Bank) as an engine for regional or national economic development – for example as a resource for isolated regions with few economic options, or as a source of foreign exchange earnings for poor countries. But it is not any and all fishing that is encouraged for economic development. Rather, fisheries development has followed the model of “modernization” applied in other areas as well, such as agriculture and manufacturing. In this model, small-scale, labor-intensive fishing for subsistence and local markets is seen as irrational and inefficient, and therefore as part of the problem. Development means replacing these fisheries with “modern,” capital-intensive industrial fishing that can generate the highest profits.

The most prominent form of government fisheries development assistance is subsidies, or funds for governments used for everything from building and outfitting vessels to port development to marketing fish. Even today, governments worldwide contribute about US\$16 billion to increasing fishing capacity, and another US\$4–8 billion in fuel subsidies (Sumaila and Pauly 2006). But governments have not just provided funds for fisheries development; they also have been central to envisioning fisheries as capital-intensive enterprises that can fuel economic development. One illustration of this larger role of government policy is the development of the fisheries along the west coast of the United States, including the fishery for pollock discussed earlier (Mansfield 2001b, 2001a). Historically, fishers in this region targeted near-shore species such as salmon and crab. In the 1960s, Japanese and Soviet factory trawlers started to target offshore species such as pollock. Then in the 1970s US government decided to embark on a program of what it called “Americanization” of these “underutilized” species, by which it meant developing a new industrial US fishery to capture these fish “for the benefit of the nation.” Subsidies were part of this fisheries development program, but it also involved a complex mix of new laws, nation-to-nation negotiations, new business models, and even cultural work to make Americanization a more general goal and to make new fish products desirable to consumers. The result of this comprehensive “modernization” program is a fleet of large trawlers and factory trawlers that targets not only pollock but a variety of other offshore species. Despite the fact that these fisheries have been tightly managed, by the late 1980s these fisheries were considered to be at capacity (both ecologically and economically), and several species (not including pollock) have been overfished.

Another, very different illustration of the role of fisheries development policy is provided by the many countries of the South that invite distant water fishing fleets from countries of the North into their waters in exchange for financial compensation and bilateral aid. These arrangements are quite prevalent in some parts of the world. For example, on the basis of these longstanding arrangements Western Africa has been called “the fish basket” of Europe (Alder and Sumaila 2004). And the world’s largest and most valuable tuna fishery is located in the western and central Pacific Ocean, where it is caught not by fleets from Pacific Island countries, but by fleets from Japan, the USA, the EU, and Australia (Petersen 2002, 2003). The fees paid for these rights to access fish are often very low, often because the receiving countries are not able to bargain effectively, given their dependence on aid from the countries doing the fishing. People studying these colonial-style arrangements have concluded that distant water fishing – which is itself subsidized in the home country – competes with local fisheries, contributes to overfishing, undermines local fishery development, exposes poorer countries to financial risk, and, ultimately, hinders economic development while increasing environmental degradation (Alder and Sumaila 2004; Petersen 2002, 2003). It seems then, that these distant water fishing arrangements are exemplary of how industrial fishing has been encouraged in the name of economic development (and consumption by the wealthy) – and of how such industrial economic development leads to further economic marginalization of the poor and degradation of the natural environment.

Industrial vs. small-scale fishing

In the name of modernization and economic development, policy makers have encouraged industrial fishing to replace small-scale and artisanal fishing. Yet, evidence suggests that it is small-scale fisheries that appear to offer a variety of environmental and economic benefits. There are currently just over two million motorized vessels worldwide; of these only 10 percent are longer than 12 meters in length, and less than 25 thousand (just over 1 percent) are industrial vessels (FAO 2008b). Because many people fish with non-motorized vessels such as canoes, this means that industrial vessels (again, those over 24 meters) account for much less than 1 percent of total vessels worldwide. From these numbers, it might be easy to conclude that it is small vessels that are “overpopulated,” and that poor fishers with small boats must be the culprit in overfishing. This is implied in the commonly repeated phrase that “too many boats are chasing too few fish.” But this attention to simple numbers ignores vast differences among kinds of fishing, such as those compiled by Daniel Pauly, a fisheries biologist who has become famous for tolling the warning bell regarding industrial overfishing. While he does not provide a precise definition of “large scale” and “small scale,” his comparison is quite informative (Pauly 2006):

1. *Catch:* Large-scale fisheries capture half the annual catch for human consumption (30 million tons annually) but almost all the fish caught for fishmeal and oil (20–30 million tons). Large-scale fisheries also produce somewhere between eight and 20 million tons of “bycatch” (bycatch is unwanted fish that are then discarded dead). Small-scale fisheries, on the other hand, account for the other half of annual catch for human consumption, with almost no catch for industrial uses or bycatch.
2. *Employment:* While capturing about half of fish catch for human consumption, small-scale fisheries employ 24 times as many people as do large-scale fisheries (12 million vs. a half million). For each US\$1 million invested in vessels, large-scale fisheries employ only 5–30 people, while small-scale fisheries employ 500–4,000.
3. *Fuel Use:* Large-scale fishing uses almost 40 million tons of fuel, while small-scale fishing uses just 5 million tons. Looked at in terms of how much fish you get for your fuel, large-scale fisheries catch just one to two tons of fish for every ton of fuel, whereas small-scale fisheries catch four to eight tons of fish for the same ton of fuel.

Information such as this cautions us to ask more questions when faced with raw numbers regarding “too many” of anything, whether people or fishing vessels. We must be careful to ask not just “how many,” but “what are the differences among them.” Even a simple distinction between large- and small-scale fisheries (which ignores large differences within these categories) suggests that labor-intensive, small-scale fishing can make important contributions to providing food and employment to coastal regions worldwide, and can do so with much less fuel and less intensive technology than does capital-intensive, industrial fishing.

This information aligns with new research on small-scale fisheries, which reverses two common assumptions. The first erroneous assumption is that poor fishers are poor because they are fishers; this assumption leads to recommendations that these people should be something else (like factory workers) and that fishing should be entirely industrial. Instead, it turns out that people fish because they are poor – in other words, fishing provides unique opportunities for *alleviating* poverty (rather than making it worse), and small-scale fisheries should be encouraged rather than undermined (Allison and Horemans 2006; Béné 2003; Béné *et al.* 2007). Second, people assume that because of their poverty, poor fishers have no other choice but to deplete fisheries to the point of overfishing. Instead, small-scale fisheries are turning out to be an important *model* for the future of fishing, because overall they are more efficient and *less* degrading than industrial fishing, and people in these fisheries are often very effective at managing their resources (Allison and Ellis 2001; Dyer and McGoodwin 1994; Pauly 2007). While it is certainly true that small-scale fisheries can degrade local environments under some conditions, it seems that blaming them for the majority of depletion is a diversion. Rather, industrial fisheries (and intensive fish farming) often compete directly with small-scale fisheries, for example by catching the same fish, disrupting ecological dynamics, or degrading habitats in ways that undermine local fisheries. In other words, what all this information suggests is that it is not poor fishers with their small boats who cause the majority of overfishing, but rather that these fishers are harmed by depletion they do not themselves create.

Contradictions of capitalism

So far, this chapter has explained overfishing as the outcome of industrial fishing happening the world over for the enjoyment of Northern consumers, all of which is envisioned and encouraged by governments in the name of fisheries development and foreign exchange earnings. It is crucial to recognize, then, that capitalist industrialization brings constant pressures for individual firms (big or small) to keep down costs. One of the main ways firms do this is by “externalizing” the costs of their impacts (including environmental, social, and health impacts), which means making the costs external to the firm itself – in other words, finding a way to make someone else pay those costs. In fisheries, this means that firms benefit from the environment – they profit from the fish – but they do not pay the full costs of the fisheries. Certainly this is the case when there are subsidies, but it is also so in less obvious ways. For example, fishing firms do not pay the full costs of fisheries management or for recovery when an area has been overfished. They do not pay when they destroy habitat or release pollutants. Industrial fleets do not pay when they undermine small-scale fisheries. Certainly this is unfair, and it is essential to understand the unequal distribution of who gets the benefits and who bears the costs when evaluating the successes and failures of a particular fishery (or fisheries in general).

Beyond immediate questions of fairness, it is also important to recognize the ways that this process of passing off the costs – of gaining benefits from fisheries

without paying the full costs – represents what some scholars have called an inherent contradiction of capitalism (O'Connor 1998; for one discussion and application of this idea, see Bakker 2003). On the one hand capitalist firms depend on the environment to provide goods and services firms themselves cannot produce; on the other hand to profit and continue to grow they are under constant pressure to destroy (by externalizing costs) the very environment on which they depend. For fisheries this means that firms fundamentally depend on environmental resources they did not create – not just the fish, but the healthy ecosystems that support the fish – at the same time that they actively undermine those same environmental resources by removing fish and degrading habitats (Mansfield forthcoming). And once firms have made substantial financial investments, they have strong pressures to keep fishing, even if so doing is destructive. There are numerous ways firms, and even whole sectors, might try to overcome this contradiction. For example, they might try to apply more technology so they can find and catch fish even while they are declining – but this makes fish more expensive and leads to less profit and more overfishing. Or they might lobby for increased government subsidy – but not only does this represent a direct externalization of costs, it also leads to more rather than less overfishing. Or, as many seafood companies are doing, they might switch from fishing to fish farming – but this comes with its own pressures to externalize costs of pollution, habitat degradation, and so on. In other words, all of these efforts to escape the contradiction only exacerbate it: externalization of the problems of fisheries undermines the very resources on which fisheries depend.

In sum

Overfishing is caused by the dynamics among industrial technology, consumer markets, models of development, and capitalist relations to nature. Overfishing is the result of the massive industrialization of fisheries since the 1950s, which vastly expanded global capacity to catch fish. But technology alone is not the ultimate cause; rather fishing technology is part of a broader political – and cultural – economy of fishing that since the 1950s has focused on “modernizing” fisheries across the world. During this time, capital-intensive fishing that generates profits and foreign earnings by feeding Northern consumers has been prioritized over “traditional” small-scale and artisanal fishing for subsistence, local markets, and poverty alleviation. Overfishing, then, is not simply the result of technological capacity, but is also explained by the need to profit by externalizing costs – even if this means undermining the resources on which fisheries depend.

Not the “tragedy of the commons”

The explanation of overfishing in this chapter focuses on *fisheries development as a political process*. That is, fisheries development imposes a particular, culturally specific vision of what nature is, who should control it, how people should use it, and who should benefit. By industrializing fisheries following this Western model

of modernity, fisheries development not only leads to overfishing, but it also intensifies socio-economic inequality. It benefits some groups of people, in particular wealthier fishers and fishing firms with access to capital for building and outfitting large vessels, as well as relatively well-off Northern consumers. And it makes things worse for others, especially poorer fishers (of the North as well as the South) who lose access to fisheries due to increasing costs and environmental degradation. In other words, modernized, industrial fisheries lead to both degradation and marginalization, each of which exacerbates the other.

The rest of this section shows that the dominant, mainstream, and seemingly *apolitical* explanation for overfishing conveniently overlooks all of this (see also Mansfield 2001a, 2004a, 2006). The dominant approach ignores all of these dynamics, instead explaining overfishing simply in terms of “the tragedy of the commons,” which is based on the idea that individual decisions are determined by property rights (Gordon 1954; Hardin 1968). In this view, if individuals do not own a resource (such as fish) they have no interest in protecting it. This is not because they don’t care, but because it is not profitable for them to do so: the individual cannot be sure that s/he will be the one to benefit, because, without ownership, someone else might come along and take whatever has been conserved. In other words, “rational” individuals are those who maximize their profits. The inverse argument is that ownership gives individuals control over access to resources, which ensures that the owner will be the one to benefit from conservation. In this view, then, private property provides incentives that match individual rationality to conservation goals. While this general argument has been applied to a wide range of resources (from trees to the internet), there is no arena in which the tragedy of the commons is more popular than in fisheries. References to “the tragedy of the commons” or to “incentives” and “rights-based” approaches, which are based on these underlying ideas about property and conservation, are ubiquitous in discussion of fisheries today. Long the view of mainstream fisheries economists (Gordon 1954; Hannesson 2004), examples also abound in the popular media (e.g. Easterbrook 2009; The Economist 2009: 17), in public policy from the Obama administration to the World Bank (NOAA 2009; World Bank 2009), and in leading scientific journals (Beddington *et al.* 2007; Costello *et al.* 2008). In this view, a lack of property rights is the problem and implementation of property rights is the solution. The most commonly referenced property right in fisheries today is some form of “catch share” or “transferable quota” system in which fishers own access to a specified share of the total fishery.

There are many things wrong with this explanation and the “solutions” to overfishing based on it. First, case study research around the world shows conclusively that the commons can be a *benefit* to conservation rather than the root of the problem (Berkes *et al.* 1989; Dyer and McGoodwin 1994; McCay and Acheson 1987; Rowe 2008). People can communicate with each other, cooperate, and have all sorts of explicit and implicit rules limiting who can use resources, when, in what ways, and so on. By showing that the commons is indeed a kind of property, not the same as open access, this evidence offers an important counter-balance to simplistic notions about common vs. private property.

Second, property-based explanations ignore the politics of fisheries development over the past 60 or so years. That is, these explanations ignore the political and cultural dimensions of fisheries development in which industrialization is a purposeful project based on Western notions of modernity and capitalist relations, as outlined in the previous section of the chapter. Instead, property-based explanations pretend that the explosion in fishing capacity in the late twentieth century “just happened” as the result of rational individual decision-making in an open-access situation (perhaps one that was encouraged by government policy, which is seen as distorting – rather than encouraging – capitalist markets). This assessment of the situation not only ignores a whole host of historical facts of the sort addressed in this chapter, but, given that it supposes a universal process, it also fails to explain why the explosion in capacity happened when and how it did. The explosion of fisheries in the twentieth century is not due to a particular property regime, but rather to the imposition of industrialization as a model of development.

Third, the problem is not just that the property-based explanations focus entirely on individual rationality while ignoring the politics of western, capitalist development. Rather, it is that by ignoring this politics mainstream analysts can pretend that “individual rationality” (defined as profit maximization) is a trait of human nature. In property-based explanations, individuals are assumed to be just like capitalist firms, in which profit is the primary motivating force. Closer attention shows that it is through this politics of western, capitalist development that many people *are forced to be* profit maximizing. For example, fishers forced into debt to keep their fishing operations alive must focus on profits. Indeed, while development specialists might pretend that being profit motivated is simply human nature, at the same time any sign of a lack of profit motive among resource users (fishers, but also farmers, hunters and gatherers, etc.) is seen as a sign of irrationality and “backwardness,” and as something to be fixed. This is, in large part, what modernization entails – encouraging people to become the profit-maximizing individuals that help drive capitalist markets worldwide (Barnes 1988; Davis 1991; Feeny *et al.* 1996).

Finally, property-based approaches are a problem not just because they misdiagnose the problem, but because they propose solutions – such as “individual transferable quotas” or other sorts of “catch share” programs – that exacerbate the problems. Quota or share programs are a way of creating property rights not to the fish themselves (which is particularly difficult), but instead rights to access the fish; they generally take the form of providing some guaranteed right to a percentage of the total fishery. The first thing to note is that it is not clear that these property rights have any direct effect on how much fish is caught. Rather, it is a government authority that determines what the total catch will be (along with seasons and other regulatory measures), while the quota determines simply *who* will catch the fish (Mansfield 2004b, 2007). In other words, any environmental protection still comes from government authority, rather than from individual incentives to conserve provided by property rights. At the same time, by determining who will catch the fish, property rights in fisheries lead to increased inequality and increased industrialization of fisheries – the very thing that has caused problems in fisheries

today (problems including overexploitation, ecological degradation, and decline of small-scale fisheries). The whole idea of property rights regimes in fisheries is to give some people access while excluding others. Quota programs can be designed to benefit different groups of people over time, but this does not negate the fact that (unless they aren't working as intended!) property-rights approaches provide the resource to some and take it away from others. Because quota permits become another expensive item that fishers must own in order to fish – the boat, the gear, and now the quota permit – in most cases those who are already better off will benefit the most (e.g. Mansfield 2007; Pálsson and Helgason 1995). Those with access to capital will be able to buy quota permits and expand their operations, and those without will reduce the amount they fish, or stop altogether. Privatized quotas on their own do nothing to prevent overfishing, while they do much to encourage further consolidation of fishing into the hands of the wealthy, and therefore to increase inequality. In other words, quota programs encourage the further demise of small-scale fishing and intensification of industrial fishing, and do so in the name of conservation!

Conclusion

In conclusion, property-based explanations and solutions to the problem of overfishing should be seen as new chapter in the ongoing story of the politics of fisheries development that has been the focus of this chapter. In the mainstream view, the lack of private property in fisheries is seen as a sign that fisheries are traditional and backward (much as a lack of profit-maximization is a sign that small-scale fishers are irrational and backward). Using quota programs to enclose the oceans as private property is the latest means for turning fisheries into the modern, capitalist, industrial enterprise that has been envisioned and encouraged for decades. Because quota programs are rooted in notions of individual rationality and the necessity of private property, they are not only completely consistent with this vision of capitalist economic development, but in fact extend it in new ways.

But there is a fundamental problem with this vision, which is that dominant approaches to fisheries are only exacerbating the underlying problems driving overfishing today. This chapter has documented that the cause of overfishing is not a lack of property rights, but the massive and very purposeful industrialization of fisheries as a driver of capitalist economic development, which then leads to contradictory pressures to degrade the very environment on which fisheries depend. By encouraging consolidation of capital-intensive fisheries, property-based approaches to fisheries management only intensify the very sort of fishing that has created problems in the first place.

Despite these fatal problems, the tragedy of the commons remains popular as an explanatory framework. This is because it is so simple and because it blames all people equally. In so doing, it allows us to avoid thorny political questions, such as about who gets to make decisions, whose lives matter more, and who benefits from both using and conserving fish and the ecosystems that produce them. But by avoiding these political issues, property-based approaches show themselves

to be *highly* political. They are part of a western, capitalist model of development that ignores history and politics by naturalizing overfishing as a problem of human nature that can be solved through capitalist markets. In the end they promote privatization as a way of further intensifying the market-relation in fisheries, and through that encourage increased industrial control of fishing. A better approach would be to promote the many small-scale fisheries that appear to be more equitable and environmentally friendly.

References

- Alder, Jacqueline and Ussif Rashid Sumaila. 2004. Western Africa: a fish basket of Europe past and present. *Journal of Environment and Development* 13 (2): 156–178.
- Allison, Edward H and Frank Ellis. 2001. The livelihoods approach and management of small-scale fisheries. *Marine Policy* 25: 377–388.
- Allison, Edward H and Benoît Horemans. 2006. Putting the principles of the sustainable livelihoods approach into fisheries development policy and practice. *Marine Policy* 30: 757–766.
- Bakker, Karen. 2003. *An Uncooperative Commodity: Privatizing Water in England and Wales*. Oxford: Oxford University Press.
- Barnes, Trevor J. 1988. Rationality and relativism in economic geography: an interpretive review of the homo economicus assumption. *Progress in Human Geography* 12 (4): 473–496.
- Beddington, J.R., D.J. Agnew, and C.W. Clark. 2007. Current problems in the management of marine fisheries. *Science* 316: 1713–1716.
- Béné, Christophe. 2003. When fishery rhymes with poverty: a first step beyond the old paradigm on poverty in small-scale fisheries. *World Development* 31 (6): 949–975.
- Béné, C., G. Macfadyen and E.H. Allison. 2007. *Increasing the Contribution of Small-Scale Fisheries to Poverty Alleviation and Food Security*, FAO Fisheries Technical Paper 481. Rome: UN Food and Agriculture Organization.
- Berkes, F., D. Feeny, B. J. McCay, and J. M. Acheson. 1989. The benefits of the commons. *Nature* 340: 91–93.
- Costello, Christopher, Steven Gaines, and John Lynham. 2008. Can catch shares prevent fisheries collapse? *Science* 321: 1678–1681.
- Davis, Anthony. 1991. Insidious rationalities: the institutionalisation of small boat fishing and the rise of the rapacious fisher. *Marine Anthropological Studies* 4 (1): 13–31.
- Dyer, Christopher L. and James R. McGoodwin, eds. 1994. *Folk Management in the World's Fisheries: Lessons for Modern Fisheries Management*. Niwot, CO: University Press of Colorado.
- Easterbrook, Gregg. 2009. Privatize the seas. *The Atlantic* 304 (1): 58.
- FAO. 1998. *The State of World Fisheries and Aquaculture 1998*. Rome: Food and Agriculture Organization of the United Nations.
- . 2000. *The State of World Fisheries and Aquaculture 2000*. Rome: Food and Agriculture Organization of the United Nations.
- . 2008a. *Fisheries Capture Technology*. Food and Agriculture Organization of the United Nations [cited August 21 2009]. Available from <http://www.fao.org/fishery/topic/3384/en>.
- . 2008b. *The State of World Fisheries and Aquaculture 2008*. Rome: Food and Agriculture Organization of the United Nations.

- . 2009. *Fishing Gear Type Fact Sheets*. Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department [cited August 21 2009]. Available from <http://www.fao.org/fishery/geartype/search/en>.
- Feeny, David, Susan Hanna, and Arthur F. McEvoy. 1996. Questioning the assumptions of the "Tragedy of the Commons" model of fisheries. *Land Economics* 72 (2): 187–205.
- Frank, Kenneth T., Brian Petrie, Jae S. Choi, and William C. Leggett. 2005. Trophic cascades in a formerly cod-dominated ecosystem. *Science* 308 (10 June): 1621–1623.
- Gordon, H. Scott. 1954. The economic theory of a common-property resource: the fishery. *The Journal of Political Economy* 62 (2): 124–142.
- Hannesson, Rognvaldur. 2004. *The Privatization of the Oceans*. Cambridge, MA: MIT Press.
- Hardin, Garrett. 1968. The tragedy of the commons. *Science* 162: 1243–1248.
- Kurlansky, Mark. 1997. *Cod: A Biography of the Fish that Changed the World*. New York: Penguin.
- McCay, Bonnie J. and James M. Acheson. 1987. *The Question of the Commons: The Culture and Ecology of Communal Resources*. Tucson, AZ: The University of Arizona Press.
- Mansfield, Becky. 2001a. Property regime or development policy? Explaining growth in the US Pacific groundfish fishery. *Professional Geographer* 53 (3): 384–397.
- . 2001b. Thinking through scale: the role of state governance in globalizing North Pacific fisheries. *Environment and Planning A* 33: 1807–1827.
- . 2003. Spatializing globalization: a "geography of quality" in the seafood industry. *Economic Geography* 79 (1): 1–16.
- . 2004a. Neoliberalism in the oceans: "rationalization," property rights, and the commons question. *Geoforum* 35 (3): 313–326.
- . 2004b. Rules of privatization: contradictions in neoliberal regulation of North Pacific fisheries. *Annals of the Association of American Geographers* 94 (3): 565–584.
- . 2006. Assessing market-based environmental policy using a case study of North Pacific fisheries. *Global Environmental Change* 16: 29–39.
- . 2007. Articulation between neoliberal and state-oriented environmental regulation: fisheries privatization and endangered species protection. *Environment and Planning A* 39: 1926–1942.
- . forthcoming. Is fish health food or poison? Farmed fish and the material production of un/healthful nature. *Antipode*.
- Myers, Ransom A and Boris Worm. 2003. Rapid worldwide depletion of predatory fish communities. *Nature* 423 (15 May): 280–283.
- NMFS. 2007. *Fisheries of the United States 2006*. Silver Spring, MD: National Marine Fisheries Service.
- . 2009. *American Fisheries Act (AFA) Pollock Fisheries Management*. National Marine Fisheries Service, Alaska Regional Office [cited August 21 2009]. Available online at http://www.fakr.noaa.gov/sustainablefisheries/afa/afa_sf.htm.
- NOAA. 2009. *Press Release: NOAA Announces Catch Share Task Force Members*. National Oceanic and Atmospheric Administration [cited August 21 2009]. Available from http://www.nmfs.noaa.gov/sfa/domes_fish/catchshare/index.htm.
- O'Connor, James. 1998. *Natural Causes: Essays in Ecological Marxism*. New York: Guilford Press.
- Pálsson, Gisli and Agnar Helgason. 1995. Figuring fish and measuring men: the individual transferable quota system in the Icelandic cod fishery. *Ocean and Coastal Management* 28: 117–146.
- Pauly, Daniel. 2006. Major trends in small-scale marine fisheries, with emphasis on developing countries, and some implications for the social sciences. *MAST* 4 (2): 7–22.

- . 2007. Small but mighty. *Conservation* 8 (3): 25.
- and Jay Maclean. 2003. *In a Perfect Ocean: The State of Fisheries and Ecosystems in the North Atlantic Ocean*. Washington, DC: Island Press.
- , Jackie Alder, Elena Bennett, Villy Christensen, Peter Tyedmers, and Reg Watson. 2003. The future for fisheries. *Science* 302: 1359–1361.
- Petersen, Elizabeth. 2002. Economic policy, institutions and fisheries development in the Pacific. *Marine Policy* 26: 315–324.
- . 2003. The catch in trading fishing access for foreign aid. *Marine Policy* 27: 219–228.
- Rowe, Jonathan. 2008. The parallel economy of the commons. In *State of the World 2008: Innovations for a Sustainable Economy*, edited by L. Starke. New York: W.W. Norton.
- Standal, Dag. 2008. The rise and fall of factory trawlers: an eclectic approach. *Marine Policy* 32: 326–332.
- Sumaila, Ussif Rashid and Daniel Pauly. 2006. *Catching More Bait: A Bottom-up Re-estimation of Global Fisheries Subsidies*. Vol. 14, *Fisheries Centre Research Reports*. Vancouver: Fisheries Centre, University of British Columbia.
- The Economist. 2009. *A Special Report on the Sea* Vol. January 3, 2009. London: The Economist.
- Weber, Michael L. 2002. *From Abundance to Scarcity: A History of US Marine Fisheries Policy*. Washington, DC: Island Press.
- World Bank. 2009. *Sunken Billions: The Economic Justification for Fisheries Reform*. Washington, DC: The World Bank and the FAO.
- Worm, Boris, Edward B. Barbier, Nicola Beaumont, J. Emmett Duffy, Carl Folke, Benjamin S. Halpern, Jeremy B.C. Jackson, Heike K. Lotze, Fiorenza Micheli, Stephen R. Palumbi, Enric Sala, Kimberley A. Selkoe, John J. Stachowicz, and Reg Watson. 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science* 314: 787–790.
- Worm, Boris, Marcel Sandow, Andreas Oschlies, Heike K. Lotze, and Ransom A. Myers. 2005. Global patterns of predator diversity in the open oceans. *Science* 309: 1365–1369.