

# *Shifting Baselines*

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THE PAST AND THE FUTURE OF OCEAN FISHERIES

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## Chapter 2

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### *The “March of Folly” in Global Fisheries*

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It has now become apparent to most interested parties that marine fisheries throughout the world are in serious trouble. Notably, the large, long-lived, and usually pricey fishes on top of marine food webs have declined by at least one order of magnitude relative to the period immediately following World War II, and global landings peaked in the late 1980s. In many coastal communities such as Newfoundland, fish stocks, which for centuries had supported vibrant fisheries, have collapsed with enormous economic and social costs. Similarly, in Ghana, West Africa, many locals no longer fish because their resource base has been depleted, largely by foreign industrial fisheries. This, in turn, has threatened the food security of local coastal communities.

Self-defeating practices are of course nothing new. In her famous book *The March of Folly*, historian Barbara Tuchman describes many instances of governments around the world pursuing policies contrary to their own self-interest and that of their people. The well-documented destruction of successive fisheries, and their supporting biodiversity and ecosystems, is a prime example of this folly. Current fisheries management policies led to the “march”—and endanger global food security. Yet there are measures that, if implemented, would overcome this pathology.

## The Folly of Fisheries

Though fisheries scientists tend to be jaded about it, the public at large does not seem to realize the enormous impact fisheries have on marine ecosystems. Particularly misunderstood is the decline of fish biomass that occurred in the last decades, intensifying earlier trends initiated hundreds to thousands of years ago. This biomass decline, which affects predominantly the large, slow-growing, and expensive predatory fish on top of marine food webs, has consequences for marine ecosystems, as well as species facing extinction. Low biomasses also have dire economic consequences, including reduced incomes for the industry. The risk of recruitment failure (and subsequent quota reductions) increases because low biomasses tend to fluctuate more widely than high biomasses, which are usually composed of numerous and overlapping year classes.

Why is it so difficult to turn fisheries around? There are many explanations, some very technical, some more obvious. Here, Barbara Tuchman's "March of Folly" is a metaphor for the key features of the global crisis of fisheries. According to Tuchman, to qualify as "folly," a policy that is manifestly contrary to the interests of those pursuing it must meet three criteria. First, it must have been perceived as counterproductive when it was originally proposed, and not merely appear foolish by hindsight. Second, an alternative course of action must have been feasible; there is no point blaming anyone for pursuing a certain policy if there was no choice. And finally, the policy in question must be that of a group or institution, not an individual ruler or policymaker, and should persist beyond the (political) lifetime of individual members of that group. Tuchman went on to document the occurrence of folly throughout history, using a number of historical vignettes. Here, we will limit ourselves to documenting folly in fisheries, and then we will present potential remedies.

Regarding the first criterion, the definition of biological and economic overfishing that emerged in the mid-1950s was all that was needed to identify policies that would have conserved fisheries resources. The fisheries, however, continued to follow trajectories established much earlier: overexploitation was followed by the collapse of one species after the other and the subsequent expansion of the fishing fleets into more distant or deeper fishing grounds. All of this was subsidized with public funds, ultimately leading to a peak in global catches in the late 1980s with subsequent, ongoing declines (figure 2.1). Moreover, explicit warnings of the inevitable outcome of overfishing were consistently ignored. In the case of northern cod, coastal fishers in the Canadian Maritime Provinces, whose ancestors had

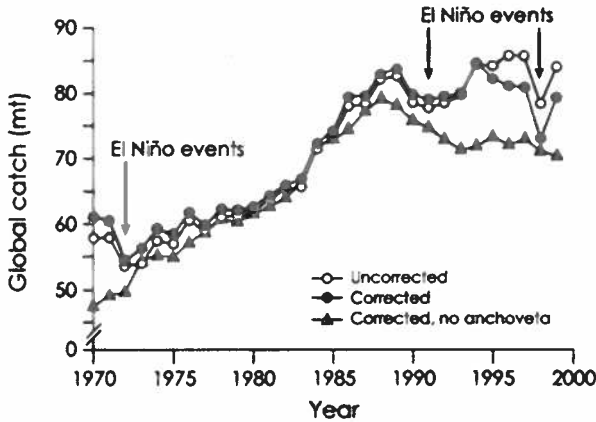


FIGURE 2.1. Global marine fisheries trends. Overall landings (*open circles*) are from the U.N. Food and Agricultural Organization (FAO) and suggest an increasing trend through the 1990s. Adjustment for overreporting by China, as proposed by Watson and Pauly in 2001, generates a decreasing trend (*solid circles*) though the 1990s. This decline, which continued in the 2000s, is even more apparent (*triangle, thick black line*) when the catch of the strongly fluctuating Peruvian anchoveta is omitted.

for centuries exploited cod in shallow waters using traps, argued against subsidizing the creation of a national trawler fleet after Canada declared an Exclusive Economic Zone (EEZ) and sent European deep-sea trawlers back home, but to no avail (figure 2.2).

The second criterion, the availability of an alternative course of action, was also met. In the 1950s and 1960s, fisheries biologists and economists advanced approaches to deal with the overcapitalization and overexploitation of fishery resources. They may not have been as sophisticated as some of the approaches currently proposed (and still not accepted). However, these measures would certainly have been more effective than the *laissez-faire* policy that was implemented and that led to a succession of stock collapses, culminating in declining global catches (figure 2.1). To return to the example of northern cod, the reasonable course of action would have been to let the cod stock, which European trawlers had decimated under open access, rebuild under the EEZ and to give the coastal fishers exclusive access to it (figure 2.2).

The third criterion—that the policy must be that of a group and be pursued for a long time—also clearly applies to fisheries. The overcapitalization and overexploitation of fisheries have been going on for a long time, well

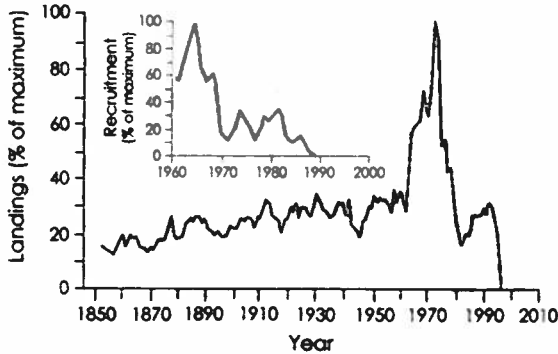


FIGURE 2.2. Time series of landings of northern cod off Newfoundland and Labrador, Canada. The slowly increasing and apparently sustainable catch from 1850 to the 1950s represents primarily the small-scale, inshore fishery that caught 150,000–250,000 tonnes per year over centuries (only the last century is shown here). The dramatic increase in the 1960s to the mid-1970s is due to foreign deep-sea trawlers that were succeeded by local Canadian trawlers in the 1980s. The trawl fleets drove catches up and the recruitment of young fish down (see time series in insert), resulting in the total collapse of the fishery.

beyond the political life of single governments all over the world. Indeed, fishing a resource down, then moving on to the next seems to have been the way fisheries have been run since time immemorial, certainly in the last decades. Moreover, we even forget about the previous abundance of resources we overexploit, and often end up claiming they never existed. This criterion undoubtedly applies to northern cod. Just consider the policies of successive Canadian governments, with the folly of excessive quota continuing even after a moratorium was declared in 1992.

### What Foolish Policies Do

Foolish fishing policies have repeatedly resulted in damage to both ecological and human systems, affecting present generations and those to come.

#### *Negative Ecological Effects*

The folly of fisheries has resulted in declines in the biomass of most of the world's large predatory fishes. Myers and Worm demonstrated this for both bottom fish stocks and the large pelagic fishes of oceanic waters. Notably,

the biomass of tuna and billfishes in various parts of the world ocean, as suggested by the catch per effort of the Japanese longline fishery, declined by a factor of 10 within ten to twenty years of being accessed by that fishery. Although this result was much disputed, at least for a few Pacific species, similar declines, using a very different, data- and computer-intensive approach, were shown for high-trophic-level neritic and oceanic fishes for the North Atlantic from 1900 to 2000, for Southeast Asia from 1960 to 2000, and for North West Africa from 1960 to 2000.

Fishing necessarily leads to declines in biomass, and some decline (to about half of unexploited biomass) is in fact necessary for a stock to generate a harvestable surplus yield. However, the declines mentioned above, those of northern cod (figure 2.2) and the multitude of stocks in the database assembled by the late Ram Myers, greatly exceed what was required to render the underlying stocks productive. Thus, as theory would have predicted, overall catches in the areas that suffered most from these declines in biomass began to stagnate, then to decline. For example, North Atlantic catches peaked in the mid-1970s and then went into continuous decline. This decline was masked by the geographic expansion of fisheries, that is, increasing landings of distant water fleets operating in places like North West Africa or the South West Atlantic, as well as by imports from even more distant areas such as the South Pacific.

However, this expansion proceeded at the rate of about 1 million square kilometers per year from 1950 to 1980, then accelerated three to four times in the 1980s. It has now reached its natural limits (figure 2.1). There was also a marked change in the composition of fisheries landings, which increasingly consist of smaller fishes from the lower part of the marine food web and reflect the scarcity of large, high-trophic-level fishes in the ecosystems (figure 2.3). This phenomenon, now widely known as "fishing down marine food webs" is far more pervasive than originally estimated (figure 2.4).

### *Negative Human Impacts*

Historically, the answer to local overfishing has been to "move on," down the food web, toward deeper waters, and to other areas or regions of the world. Excess fishing effort by European vessels, for example, has traditionally been exported toward West Africa. Alder and Sumaila have demonstrated how this region of the world has attracted an increasing number of distant water fleets from western and eastern Europe, and from Asia

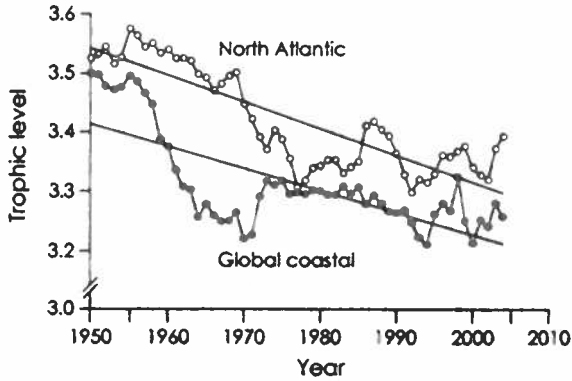


FIGURE 2.3. Decline of mean trophic level of fisheries landings reported by FAO. The data were mapped into 180,000 cells of 1/2 latitude/longitude degree according to the global information system (GIS) based procedure of Watson and colleagues in 2004. The two series shown here are for the North Atlantic (all waters north of 26° N) and for coastal waters globally, defined here as 200 kilometers out from coastlines.

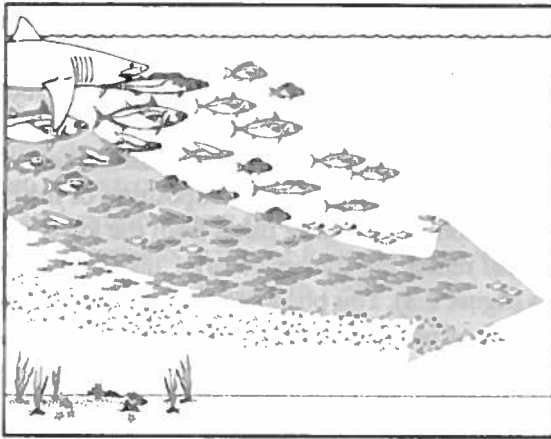


FIGURE 2.4. What “fishing down marine food webs” means. Fisheries, after having removed the larger fishes at the top of marine food webs, must target fishes lower and lower down, including the prey and the juveniles of the larger fishes, which thus fail to recover. At the end, the fisheries target plankton species, including jellyfish. Bottom trawling compounds the problem by removing animals on the seafloor that offer shelter and food to the juveniles of numerous commercial fish species, thus further hampering their recovery.

between 1960 and 2000. The result has been steep declines in biomass in the waters off West Africa. West African countries received no real economic or social benefits for their depleted marine resources and suffered instead a serious decline in food security, as has been shown for Ghana's coastal fishing communities. Similarly, the collapse of cod stocks in Newfoundland in the early 1990s illustrates how an entire province in a developed country can suffer significant economic, social, and cultural losses because of foolish policies (figure 2.2). In addition to the huge economic and social costs imposed on the current generation, the destruction of marine resources will ultimately hamper the ability of future generations to meet their needs from marine ecosystems.

### Some Reasons for Foolish Fisheries Policies

Foolish fisheries have their roots in fundamental failures in economics and governance, lack of well-defined catch rights, pernicious subsidies, technological progress, removal of market barriers associated with economic globalization, and shortsightedness in economic valuation.

#### *Open Access and Common Property*

The folly in fisheries is at least partially due to the open access and common property nature of fisheries. Fishing enterprises often operate without controls because catch rights—whether individual, communal, or state—are poorly defined, absent altogether, or not enforced. Open access or common property fisheries repeatedly lead to overcapitalization and overexploitation. This argument has led to various measures, especially at the international level, aimed at turning fisheries away from open access. A case in point is the 1982 U.N. Convention on the Law of the Sea (UNCLOS), which formally established the right of coastal nations to exploit, and the duty to protect, the marine resources within their 200-mile Exclusive Economic Zones. UNCLOS thus turned what used to be a global common into the property of coastal nations. However, UNCLOS did not solve the problem of "domestic open access," the problem of open access on the high seas, or the problems due to the transboundary or "shared" nature of some fishery resources. Thus, in many cases fisheries are still effectively open access, and hence the continuation of the "March of Folly."



### *Subsidies*

Governments around the world continue to provide massive subsidies to the fishing sector, which intensify overcapitalization and overfishing. The worldwide amount of subsidies to the fishing sector is nearly \$30 billion per year, much higher than the previous estimate used by the World Bank. This, when fisheries economists have shown again and again that subsidies enable otherwise bankrupt fishing fleets to maintain their pressure even on collapsed stocks.

### *Technological Progress and the Removal of Natural and Market Barriers to Overfishing*

Over the last decades, new developments in fishing gear and sophisticated onboard electronics for fish finding, geopositioning, and the like have multiplied the fishing power of individual vessels, turning even small units into efficient fish-killing machines. Thus, fishing fleets have become powerful enough to overexploit essentially all stocks in the world, anywhere, any time of the year, thereby removing the last available "natural protection" afforded by depth or distance from shore. The loss of this natural protection, moreover, is not compensated for by the establishment of marine protected areas, which presently cover only about 0.7 percent of the area of the world's ocean. Technological improvements in preservation and transportation of fish products have also significantly increased the scope of international trade. This resulted in the removal of what may be described as market barriers to fishing: rather than being limited by their domestic market, the fisheries of various countries now have access to a global market with significantly higher demand for fish.

### *Shortsightedness in Economic Valuation*

An important driver of the folly in fisheries is shortsightedness in valuation, stemming from the general human tendency to view what is closest to us as large and important, while discounting similar objects that are far away as small and less important. A similar tendency prevails with time, and it is operationalized by the economic concept of discounting. That is, values to be received in the future are reduced to their present equivalent value using a discount rate. In comparing the present values of policy alternatives, it is

standard to discount net benefits that will accrue in the future compared to net benefits that can be achieved today. Cost-benefit analysis discounts streams of net benefits from a given project or policy alternative into a single number termed *net present value*. Thus, assumptions about the discount rate used in these time stream comparisons can have a huge impact on the apparent best policy or project. In particular, high discount rates favor the short-term policies that have led to unsustainable use of natural resources and particularly to global overfishing, as illustrated here for the recent collapse of northern cod off Newfoundland (figure 2.5).

Clearly, this widespread shortsightedness needs to be overcome. As Fearnside pointed out, decisions about the relative weight of short- versus long-term effects (in other words, the interests of current versus future generations) are a matter of policy rather than a scientific question. In principle, most of the world's countries favor a long-term approach. For example, the Magnuson-Stevens Fisheries Conservation and Management Act specifically requires that the interests of future generations be taken into account in the management of U.S. fisheries.

In practice, these decisions depend on the discount rate chosen to evaluate particular projects. Tol pointed out that the choice of discount rate and discounting approach is both empirical and ethical. It is empirical because people do make trade-offs between the present and the future in their daily

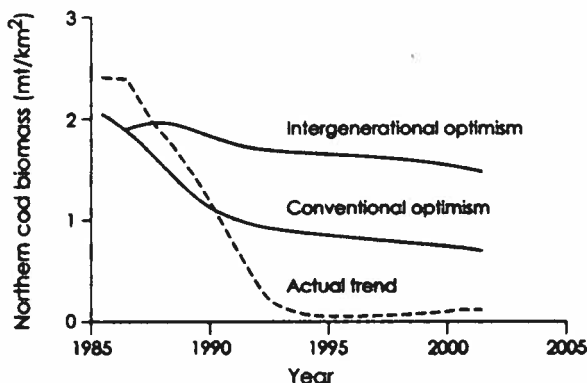


FIGURE 2.5. Comparison of cod biomass profiles under different management schemes and economic discounting. Note the large differences in the cod biomass resulting from the actual history of the fishery, characterized by utterly ineffective management, the biomass that would be left in the sea if conventional (and shortsighted) valuation and discounting had been used, and the large biomass that would be still be available if an intergenerational discounting approach had been applied.

decisions. It is at the same time ethical because the discount rate determines the balance of intergenerational allocation of goods and services. Tol suggested that neither the empirical nor the ethical should overrule the other. He also identified personal and social taste as factors in economic preferences. Since political choices reflect social taste, whereas personal taste reflects personal economic choices, people may prefer the use of lower discount rates to evaluate societal goals and objectives, even while using a higher rate for their personal decisions. After all, we know that at least some members of the current generation actually care about benefits to generations yet unborn. Of course, reversing the tendency to shortchange the future would stop the depletion of fishery resources and begin rebuilding depleted ecosystems for the benefit of future generations. Under these considerations, all generations should agree that overcoming shortsighted decision making would be the right thing to do.

### Finding a Cure for Folly in Fisheries

There are four primary ways in which we can address and resolve the folly and collapse of fisheries.

#### *Address Open Access, Common Property, and Subsidies.*

To overcome the open access problem, we need more effective ownership structures at different levels, from the local to the national and beyond in the case of straddling stocks and high sea fisheries. The current literature on open access and common property tends to emphasize the privatization of fishing rights, although the revitalization of public ownership through lease or auction systems also appears promising and compatible with legal and cultural constraints in Western societies.

Additionally, we must forgo destructive subsidies. Subsidizing fisheries in developing countries is just as damaging as the grotesque subsidies in agriculture. Subsidization drives the folly of fisheries—without a stop the march goes on.

#### *Reestablish Natural Protections by Creating Marine Protected Areas.*

There is a clear need to reestablish the natural barriers to fishing that technological progress has removed by creating a global network of marine re-

serves. This would not only enable key stocks to recover, but also provide protection against assessment errors, acknowledged to be a common cause of collapses.

*Engage in Aquaculture That Increases Rather Than Diminishes Food Protein Supplies.*

Aquaculture has grown tremendously in the last decades, and is seen by many as the solution to food supply shortages. There are two main problems with this. First, the bulk of the reported increase in global aquaculture production consists of carp and closely related fish in China, and there are good reasons to assume that the overreporting besetting Chinese fisheries catch statistics also affects these aquaculture statistics. Second, in most other parts of the world, aquaculture growth is driven by increasing production of carnivorous fishes such as salmon, bass, and tuna, all of which consume more fish products than they themselves contribute. In terms of detrimental fisheries effects alone, this practice actually increases pressure on wild fish and removes cheap fish from developing country markets. Thus, aquaculture produces net fish for society mainly if it is limited to the farming of herbivorous fish such as tilapia and suspension-feeding invertebrates like mussels and clams.

*Overcome the Tendency Toward Shortsightedness.*

We absolutely need to deal with the still pervasive shortsightedness in valuation, as expressed by high discount rates. We must value benefits and adjust discounting practices in a manner that explicitly takes into account the interest of future generations as well as the present generation. This will only happen if natural resource scientists actively engage with and advise decision makers, making them and the public aware of the future consequences of considering only the economic, social, and political pressures of the here and now.

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