



# Overfishing, a major threat to the global marine ecology

In 2002, 72% of the world's marine fish stocks were being harvested faster than they could reproduce. Fishing activities have various negative impacts on marine ecosystems. The greatest concern is the rapid depletion of fish population due to extensive commercial fishing. A full one-fourth of the total catch (27 million tonnes in 2003) is not those targeted, and most often are lost.

## Background

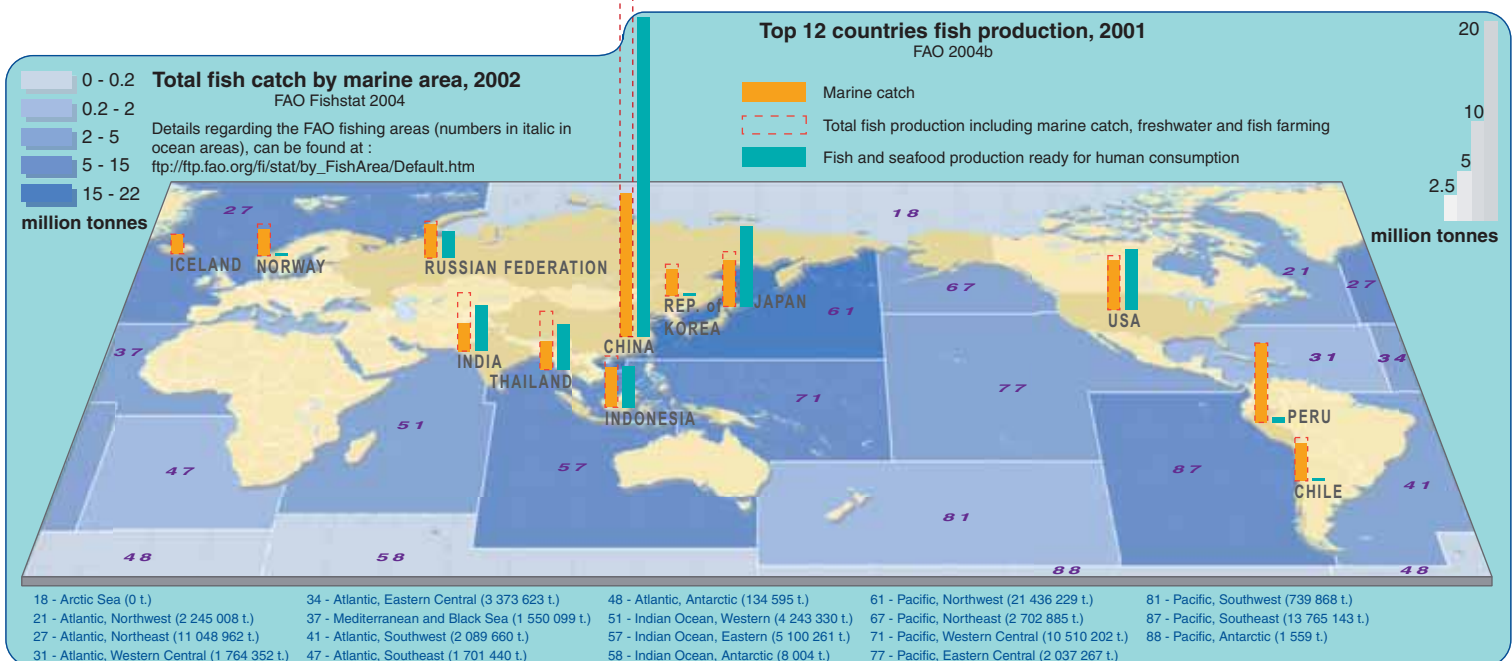
Overfishing occurs when fish are caught faster than they can reproduce, and for many scientists it has become one of the greatest impacts of human activity on oceans. Overfishing increases the vulnerability of ocean ecosystems and may contribute to the decline of other marine species including birds and mammals.

The record figure for total fisheries production (captured and farmed) was around 100 million tonnes and was calculated for the year 2000. This apparent abundance masks a serious decrease in the productivity of many fish species.

The deterioration of global fisheries is raising significant concern, mainly because an estimated one billion people, mostly in low-income countries, depend on fish as their primary source of food. On the average, fish supply 16% of animal protein consumed by humans. The fishing industry, ranging from

subsistence fishermen to large-scale mechanised fishing vessels, directly or indirectly employs some 200 million people worldwide. The economic sector depending on fisheries is therefore a crucial element for the development of a large number of countries.

According to the Food and Agriculture Organization of the United Nations (FAO), 47% of global fish stocks are fully exploited, thus offering no reasonable expectations for further expansion, and another 18% are reported as over-exploited. Major changes in the composition of global catch to species of lower economic values have been reported, since high-demand species are being captured even in their immature stage. As harvest shrink, the prices of most fish species continue to rise, making fish a less affordable food source among low-income populations.



## Causes of the decline

### Technology

Today's fishing technology is highly elaborate. Fishing lines can reach as much as 120 km, furnished with thousands of hooks. Some trawlers reach 170 metres in length and can take on board the volume equivalent of 12 jumbo jets, and drift-nets can exceed 60 km in length. Fishing vessels cover large distances at high speed, from coastal zone to high seas. They fish at great depth, stay at sea for several months, while fish are often prepared for the markets *on board*. Destructive sea-bed habitat *bottom trawling* involves powerful boats dragging heavy, metal-weighted nets across the ocean floor to catch the maximum possible amount of bottom-dwelling life. Each year, bottom trawlers drag an area twice the size of the continental United States! Sonars, air monitoring systems and satellite platforms help to locate fish schools and follow them with greater ease. Navigation apparatuses, such as Global Positioning System (GPS) and radar allow boats to constantly reconsider the best fishing spot, with very high precision. Fresh fish is a highly perishable product and its consumption was traditionally limited to coastal areas. With modern transport and food preservation technologies, one can offer fresh fish during all seasons, anywhere in the world.

### Open access and over-capacity

Over-capacity is the presence of too many vessels in a growing number of fisheries. Fish stocks have generally been considered common property, open to exploitation by anyone with a boat and gear as long as they were used outside a country's 200 Mile Exclusive Economic Zone. If enough fish are caught to cover operating costs, there is little economic incentive to stop fishing once a vessel is built. As more fishermen enter the system, greater effort is required to catch a dwindling supply and revenues fall. In time, fish stocks can be severely depleted. Excessive fishing capacity leads to overfishing and therefore to the degradation of fishery resources. Such unsustainable practices, creating a conflict between short-term and long-term gains, lead to serious impacts on biodiversity and diminish vital food production potential for a number of developing countries.

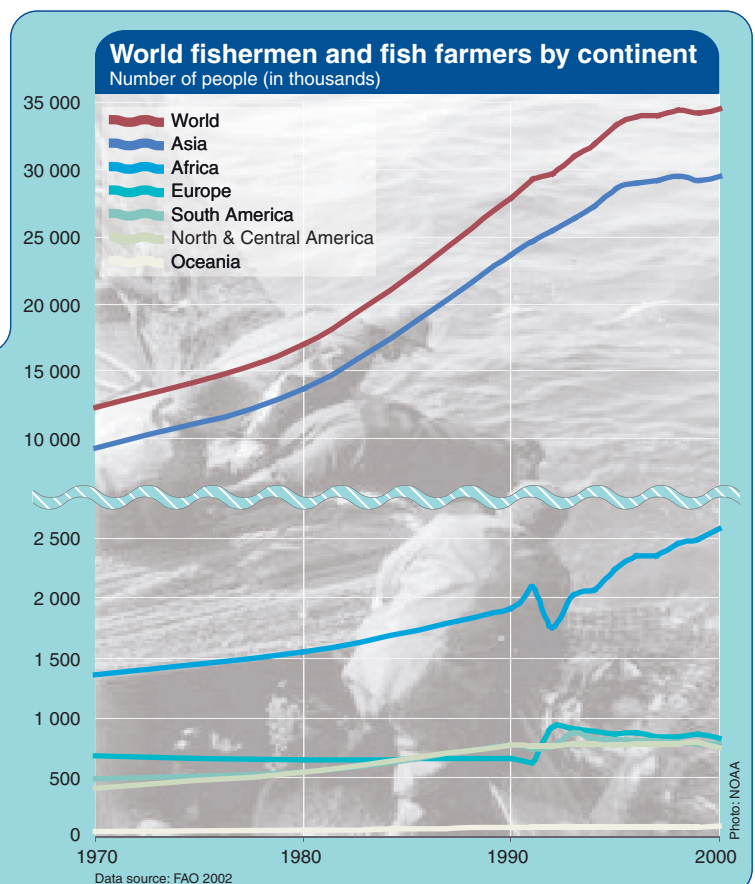
### Subsidies and jobs

Large economic losses have plagued the global fisheries sector for more than a decade. However, national governments have traditionally heavily subsidised the fishing industry, since it is an important source of employment, food and export earnings. Such subsidies have often been used with little consideration for their long-term damage to natural resources. Global subsidies, which reach about US\$ 13 billion per year, encourage fishermen to remain in a depleted fishery even though it may no longer be profitable, thus further depleting marine resources. About 50 million people (including 35 million fishermen) worldwide depend directly on fishing for their living. According to the FAO, reducing the large - and medium - scale fishing industry by half might eliminate several hundreds of thousands of jobs. Reducing the small-scale, artisan-fishing sector by half would eliminate several million jobs.



### Bycatch

The word "bycatch" refers to the portion of marine life caught that was not targeted. It may include low-value species but also vast tonnage of young or undersized fish of valuable commercial species. Almost 25% of all the fish pulled from the sea never make it to the market. An average of 27 million tonnes of unwanted fish are thrown back each year, and a large portion does not survive. Sometimes bycatch fish are kept for the market, but most often they are thrown back dead, because they may be the wrong species, the wrong size, of inferior quality, or surplus to the fishing operations quotas. The potential effects of bycatch are not just for commercial fish stocks, but the entire diversity of species in marine ecosystems and essential food chain components. Bottom trawling nets are indiscriminate and tend to pick up everything in their path with an extremely high bycatch rate. For example, up to 95% of the take in halibut trawling can be bycatch, which include a variety of endangered or over-fished species.





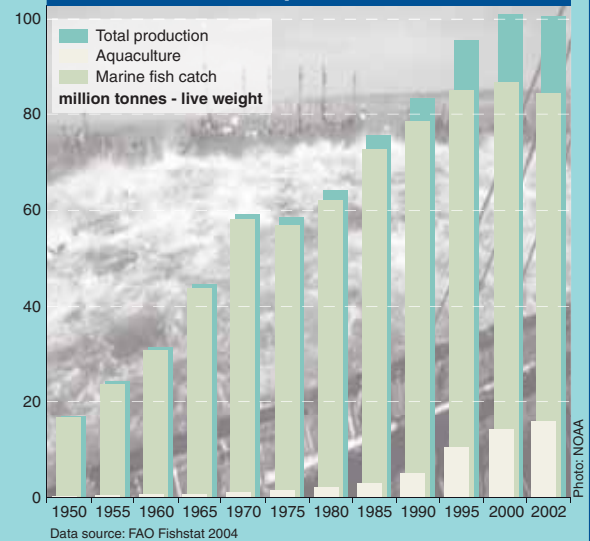
### Aquaculture

The decline in marine fish catch has been largely offset by increased aquaculture production, which grew from 2 million tonnes in 1980 to nearly 16 million tonnes in 2002. In view of its evident success and declining wild stocks, policy makers and fisheries managers often see it as an alternative to marine fishing, as it has the potential to take pressure off wild stocks and also provide economic development opportunities. Ironically, if not practised wisely, aquaculture can actually increase pressure on wild stocks and cause environmental damage, including to fish habitat, and affect other sectors of the food supply chain.

Some concerns focus on potential environmental and ecological risks. For example, cross-breeding between wild stocks and escaped domestic strains of fish could weaken the genetic makeup of wild populations. The risk of disease can be increased in farmed fish cultivated in confined areas, with the possibility of subsequent transmission to wild stocks exists. Fish farming requires suitable areas for development and can therefore lead to destruction of important habitat of wild stocks. For example, cutting down mangroves to provide areas for the construction of fish pens is cited as one of the major reasons for the destruction of as much as 24% of the world's mangrove swamps, which, like other wetlands, are important spawning and nursery areas for shrimp and fish.

Aquaculture also has social implications. In developing countries, fish farms are often owned by foreign companies who displace small fisheries in order to produce high-value products such as shrimp for export to richer countries. Shrimp farming in particular is reported to have caused serious problems in a number of developing countries such as Thailand, India, Malaysia and Ecuador, where it destroyed mangroves, caused water shortages, damaged crops because of seepage of salt water from ponds, and polluted rivers.

### Global trends in marine fisheries and aquaculture



### Reefs threatened by destructive fishing



Note: Areas classified as threatened by destructive fishing practices are based upon a 20-kilometre radius zone from known occurrences of dynamite or cyanide fishing as found in ReefBase (ICLARM, 1997) and were revised based upon expert opinion obtained at the two-day "Reefs at Risk" workshop held in September 1997 in Manila.

### Food security

Fish depletion constitutes a threat to food security. In Asia alone, over a billion people depend on fish and seafood as their major source of animal protein. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) warns that fish, long regarded as the "poor man's protein", is diminishing globally as a result of increasing market demand and overfishing. While citizens of developed nations have average annual supplies of about 26kg of seafood per person, people in developing countries have only nine kg per person/year. For people who are highly dependent on fish in their diets, uncertain supplies increase their vulnerability. Moreover, in the next 30 years, more than 6.3 billion people are expected to make their home in already densely populated coastal zones world-wide. Coastal population growth often results in an ongoing increase in the number of people fishing in depleted near-shore areas.

### Destructive fishing

Cyanide fishing is a popular method to capture live reef fish for the seafood and aquarium markets. It is widely practiced in South-eastern Asia and the South Pacific (see map) and is now spreading to other parts of the world. Cyanide fishermen squirt cyanide into coral holes and crevices, where reef fish seek refuge. The cyanide stuns the fish, making it easy for fishermen to capture their prey. Cyanide poisons reefs and is extremely harmful to coral polyps and other reef organisms. Furthermore, less than half the fish caught with cyanide survive long enough to be sold to aquariums or restaurants. Destructive cyanide fishing practices are spreading from currently over-harvested and devastated reefs in the Philippines - where an estimated 65 tonnes of cyanide are sprayed each year - to remote coral reefs in eastern Indonesia and other nations of the western Pacific.

Fishing with explosives, also known as "blast fishing", has probably been in existence for centuries and is apparently spreading. Explosions can produce fairly large craters, devastating 10 to 20 m<sup>2</sup> of sea-bottom. Explosions kill both the target fish and the accompanying flora and fauna, the blasts being indiscriminate to size or species. Explosives and raw materials used as components, such as fertilisers and sugar, are cheap and easily available. Commercial explosives are often obtained from mining or building activities. Fishermen often only need to extract the explosive charges from munitions left over from on-going or past armed conflicts. In other areas, fishermen can access army munitions through illegal channels.

## Actions / Solutions

Although a growing number of countries have adopted fleet reduction programmes, over-capacity has been recognised as a serious problem by most fishing nations. Around 120 countries have discussed issues such as overfishing of the world's major marine fishery resources, destructive and wasteful fishing practices and excess capacity, and adopted an "International Plan of Action for the Management of Fishing Capacity". The Plan's objective is to achieve "an efficient, equitable and transparent management of fishing capacity".

The FAO estimates that the world fishing fleet numbered about 3.8 million vessels in 1995 of which nearly 1.2 million were vessels with storage space. The fact that fishing capacity reduction has often been achieved by relocating vessels in other countries' fisheries or in high seas' fisheries is of serious concern, as it does not contribute to a global reduction of fishing capacity. Significant reductions in fishing capacity in highly populous and least-developed countries are not likely to occur due to increasing social pressure.

The best way to reduce bycatch would be to lower the total fishing effort as much as possible, and develop selective technologies, better regulations and stronger enforcement. So far, only eight countries have imposed a total or partial ban on *bottom trawling* (New Zealand, Indonesia, Philippines, Scotland, Italy [Sicily only], Kenya, Seychelles and Greece). In all studies conducted within these countries it was found that pressure on fish resources had been alleviated and stock recovery had taken place.

As a recent action, the Economics and Trade Branch (ETB) of the United Nations Environment Programme convened the fifth Workshop on Fishery Subsidies and Sustainable Fisheries Management on 26-27 April 2004 in Geneva. The workshop offered an open forum for exchange of views and opinions on the impacts of fishing subsidies and the means for reforming them.

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 UNEP Economics and Trade Branch at [www.unep.ch/etu/Fisheries%20Meeting/FishMeeting2004.htm](http://www.unep.ch/etu/Fisheries%20Meeting/FishMeeting2004.htm)  
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 United Nations Atlas of the Oceans at [www.oceansatlas.org](http://www.oceansatlas.org)

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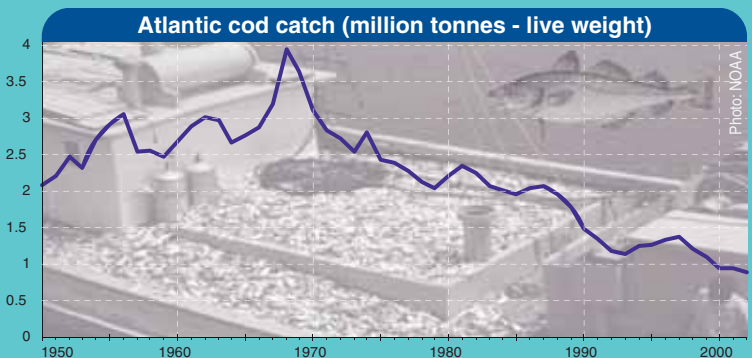
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### European fishing quotas

At the end of 2003, the European Council of Fisheries Ministers adopted a long-term recovery plan for endangered fish stocks. What were difficult negotiations finally resulted in a balanced compromise. The latest decisions also take into account social aspects, i.e. fishermen will be able to continue fishing at a reduced level and will not have to stop altogether. At the same time the compromise is also justifiable in biological terms since long-term recovery plans will be in force for the first time for endangered stocks such as cod, hake and plaice (the plan aims to increase cod stocks by 30% and by 5% for the hake in the next ten years). For threatened stocks, the inadequacy of annually adopted measures will be replaced by multi-annual programmes tailored to each region and the state of each fishery. These will not only involve catch quotas and restrictions on fishing effort, but also tighter policing.



Overfishing has severely depleted cod stocks in the Atlantic. The cod catch has plummeted over the past 30 years and some fisheries have been closed entirely. FAO warns that cod and many other heavily fished stocks will recover only if catches are sharply reduced and carefully monitored for at least a decade.

Data source: FAO Fishstat 2004

### For further information

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