

HUMAN ASPECTS ON FISHERIES

Key words: Reefs, Overfishing, Bycatch



Fig – 2.1

INTRODUCTION

Throughout history people have caused themselves problems by not understanding the consequences of their actions. Many people tend to think of fish species in isolation, but each species is part of a complex ocean ecosystem. There are interactions between fish, plankton, nutrients, water and air, if we don't understand how these interactions work, we can upset the relationships between species or between species and their habitat. So, without meaning to, we upset the balance of oceanic ecosystems.

People have been fishing since prehistoric times, for food, for profit, and for leisure, but it is only in the last few decades that there has been serious concern about overfishing. This has been partly caused by a dramatic increase in the world's population and greater international demand for food, fish meal and other marine products.

Both recreational and commercial fishing are now big business. Some commercial boats are large and are capable of staying at sea for months at a time, processing fish as they catch it. Some big boats can process 100 tonnes of fish a day. Fish yields have increased nearly fivefold over the past four decades. The current reported world total marine catch is about 90 - 100 million tonnes. The actual catch could be 30 - 50 percent higher.

At the same time, there has been an improvement in fish-catching technology, especially in deepwater fisheries. Processing, storage, transportation, and marketing systems have also improved. For example, fish finders are now used to locate fish and whole fish can now be packed in ice and sent by plane to arrive fresh or even live in overseas markets.

Human Impact on the Great Barrier Reef:



Fig – 2.2

Overfishing:

Reefs are suffering directly and indirectly from the increasing pressure of mans' resource exploitation (Reef Education Network). Overfishing is one driving pressure that has had devastating impacts on coral reefs. Aggressive fishing methods have hurt coral reefs sometimes beyond repair. However, over-fishing in general is also a damaging problem to many coral reefs around the world. Specifically to the Great Barrier Reef, overfishing has caused a shift in the reef ecosystem. Overfishing of certain species near coral reefs can easily affect the reef's ecological balance and biodiversity (Reef Education Network).



Fig – 2.3

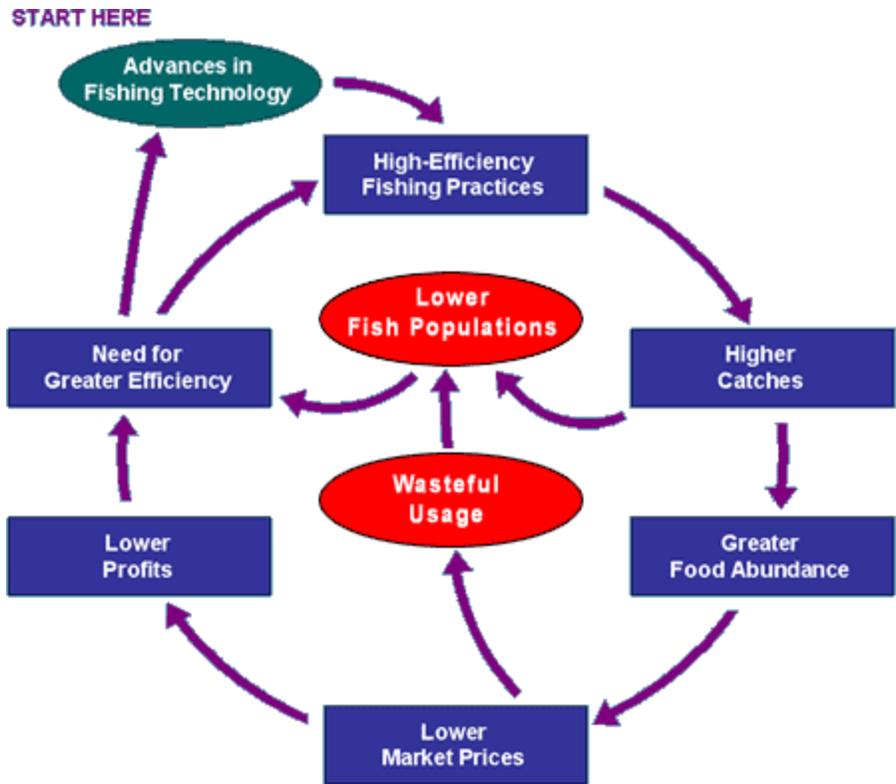


Fig – 2.4 - Causal loop of overfishing - reinforcing loop
 Courtesy: <http://www.grinningplanet.com/2005/06-07/fishing-cycle.gif>

Human impact on the fish diversity in the four largest lakes of Sweden (Document)
 (Article from AMBIO: A Journal of the Human Environment)



Fig – 2.5

The four largest Swedish lakes, Vanern, Vattern, Malaren, Hjälmaren, host important commercial fisheries for char, salmon, trout, whitefish, vendace (cisco), perch, pike-perch, pike and eel, i.e. highly diverse biological resources. Case studies illustrate physical, chemical and biological impacts on some of these commercial species caused by constructions of dams and ship canals, eutrophication, and overexploitation. Although some original species have been lost and a few new species have been added, the recent human interference has basically caused major shifts in dominance of the fish community structures because of eutrophication, alterations in the abundance of eel or crayfish, and due to overfishing. The latter is in some cases caused by the Great Lake Fishery Paradox- in an environment with several predators and competitors, but with ample food resources, especially salmonid fish but also species like pike-perch may adapt a life history favoring growth over sexual maturation. If harvested at a conventional size these populations will decline rapidly due to too small spawning stocks.

Impacts of Overfishing:

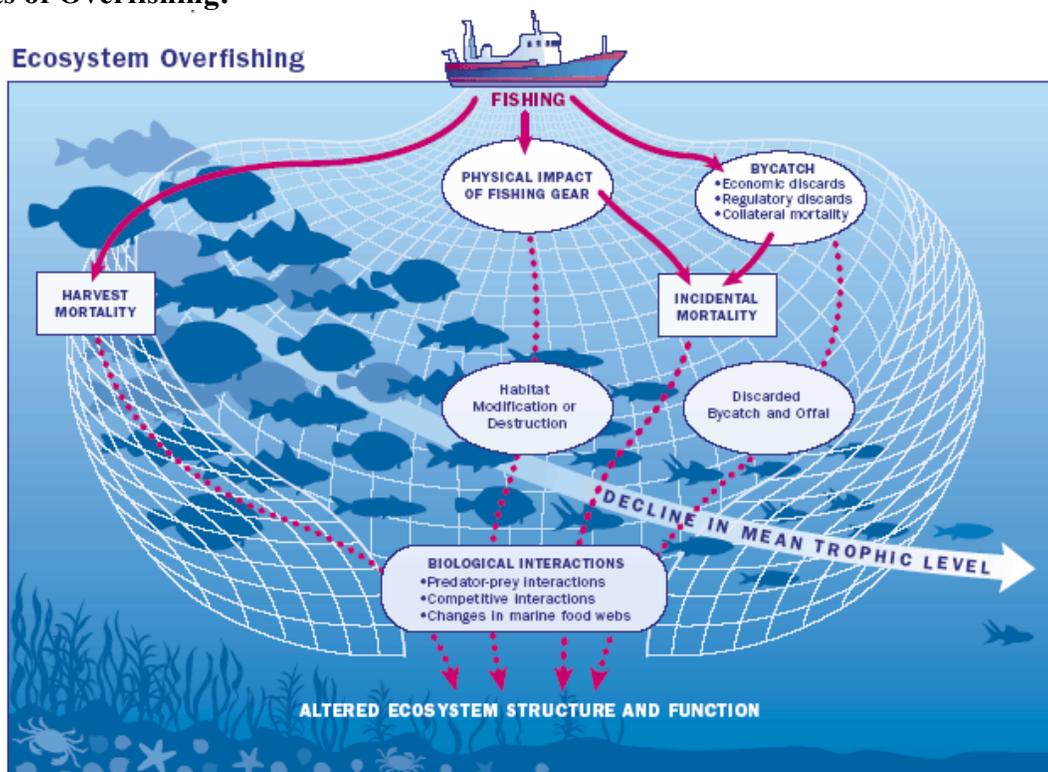


Fig- 2.6

- Destructive fishing techniques can have direct physical impacts on reef environments or create a deceit of certain species in the ecosystem.
- Unauthorized fishing occurs in areas that are not supposed to be fished causing even further destruction to coral reefs (Great Barrier Reef Marine Park Authority).
- The vulnerability of coral-reef species is partly because of their life-history adaptations to uncertainty in survival of recruits and juveniles in diverse communities where predation and competition are intense.

- With low rates of survival of recruits, multiple attempts at reproduction are favored through longevity and large size. These traits lead to low rates of population turnover and special vulnerability to overfishing.
- Ecosystem overfishing occurs when overfishing affects multispecies assemblage composition, food-web dynamics, or ecosystem function
- Overfishing can devastate the marine ecology of the Great Barrier Reef because of the specific needs of the coral reef. Since certain amounts of nutrients, oxygen and salt content the fishes in the coral reef ecosystem help maintain the balance needed by the corals, without these fishes the coral reef will collapse (Coral Reef).

By-catch:

When commercial fishers are targeting a particular species they can also catch other fish species, and sometimes birds and marine mammals. This is known as by-catch. Marine mammals and sea birds are protected under law. Over the last few years the fishing industry has taken steps to minimize unwanted by-catch, for example by designing better nets, blowing hooters to scare seals and making their lines more visible so birds can avoid them.

Reclamations

Land reclamations can destroy nursery grounds of juvenile fish and the habitats of shellfish. Many coastal cities e.g. Wellington, Auckland and Lyttelton, have reclaimed shallow marine areas for extra land. Reclamation is still continuing around New Zealand, but now environmental Impacts Reports are required as part of the consent process. Regional coastal plans are also required to be prepared by regional councils, setting out what activities and effects are allowed in the coastal marine area. The impact of reclamation on fisheries resources is more likely to be taken into account.

Mineral Exploitation

Oil production, with its associated pollution risks, and mining of the seabed and beach sands can disrupt marine habitats, Mining companies are now much more aware of environmental impacts than in the past.

Pollution

Dealing with waste products is a worldwide problem for both developed and developing countries, Many cities and large industries have often chosen the "out of sight, out of mind" option, discharging sewage and waste products into the sea, Some of the waste products are toxic. In parts of the North Sea, some fish are now so contaminated they're unfit to eat. Some fish are being born deformed.

Rubbish

Rubbish, such as plastic and bits of fishing nets dumped at sea or on the foreshore is a menace to

fish, marine mammals and birds. Fishers are often blamed for this, and while some probably are still irresponsible.

Enhancement (reseeding)

Enhancement is another more positive human impact. It involves releasing hatchery-reared young into the wild or providing additional protection to naturally spawned juveniles. This is not done on a wide scale, because of cost, the exceptions in New Zealand being scallops and salmon. Research is being done on snapper and rock lobster enhancement.

Global Warming

A changing climate will affect the marine environment, altering sea levels, temperature and salinity, current direction and strength, nutrient level and the nature and distribution of the boundaries between water masses. These changing conditions will change the distribution, reproduction and growth of many fish species.

Ozone Depletion and Ultraviolet Impacts

UV-b is the most harmful component of ultraviolet radiation. A higher level of UV-b radiation is reaching the earth because of the reduction in the ozone layer. Scientists have not yet been able to predict reliably the effects of this on marine life, but there is increasing worldwide concern about the impact on plankton and marine ecosystems.

Comparing effectiveness of experimental and implemented bycatch reduction measures: the ideal and the real.

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Fishers, scientists, and resource managers have made substantial progress in reducing bycatch of sea turtles, seabirds, and marine mammals through physical modifications to fishing gear. Many bycatch-avoidance measures have been developed and tested successfully in controlled experiments, which have led to regulated implementation of modified or new fishing gear. Nevertheless, successful bycatch experiments may not translate to effective mitigation in commercial fisheries because experimental conditions are relaxed in commercial fishing operations. Such a difference between experimental results and real-world results with fishing fleets may have serious consequences for management and conservation of protected species taken as bycatch. We evaluated reimplementation experimental measures and post implementation efficacy from primary and gray literature for three case studies: **acoustic pingers** that warn marine mammals of the presence of gill nets, **turtle excluder devices** that reduce bycatch of turtles in trawls, and various **measures to reduce seabird bycatch** in longlines.

NOAA's National Marine Fisheries Service (NMFS) Office of Protected Resources cooperates with partners to conserve and recover protected marine species by minimizing human impacts. Below are some examples.

Fisheries Interactions (Bycatch):

The Office of Protected Resources' **Fisheries Interactions program** works to implement section 118 of the Marine Mammal Protection Act (MMPA) and regulations governing the incidental capture of marine mammals in commercial fisheries. The Office works with NMFS' regional offices through take reduction planning to reduce marine mammal bycatch in commercial fisheries. Additionally, the Office works to reduce bycatch of marine turtles by implementing management measures such as time/area closures, modifications to fishing gear and practices, and safe sea turtle handling practices.

Ocean Sound/Acoustics:

Intense underwater sound can harass or harm marine mammals. Human sources of sound include military activities, vessel operations, petrochemical and geophysical exploration, marine construction, and research activities. NMFS experts review proposed underwater activities and develop solutions to minimize the potential impacts to marine mammals.

Ship Strikes:

Many species of marine mammals are injured by ship strikes. The problem is greatest for the critically endangered Northern right whale, one of the most commonly struck species. The Office of Protected Resources, in cooperation with the U.S. Coast Guard, works to minimize ship strikes by relaying information about recent whale locations to mariners. In addition, large ships are required to report when they enter areas with a high risk of a ship strike.

Viewing Wildlife:

Viewing marine animals can be educational and enriching when conducted responsibly. However, without certain precautions, these activities can put both the animals and the viewers at risk. The Office of Protected Resources promotes responsible wildlife viewing through posters, pamphlets, and workshops.

Safely Deterring Marine Mammals:

Human-marine mammal interactions are usually considered from the perspective of the impact of human activity on marine mammal populations or individuals. However, marine mammals may have an effect on human activities or property. As a result of such conflict, Congress included a provision for deterring marine mammals in section 101 of the MMPA to allow certain people to use safe, non-lethal methods to deter marine mammals to protect private or public property. (NMFS, in collaboration with other Federal and state officials, has prepared information for deterring marine mammals, which is available on page at NMFS' Northwest Regional Office and NMFS' Southwest Regional Office.)

Source:

<http://nptel.ac.in/courses/120108002/2>