Overfishing and By catch

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Antarctic Fisheries

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Jill Nicholls 1999

Introduction

For more than fifty years northern commercial fisheries have been plagued by the depletion of fish stocks in all the major oceans. Recovery is sometimes slow and at other times cannot take place at all due to a number of factors including the altered pattern of the food web in the area Mackenzie (1997). Anchovies, tuna, swordfish and many others have been depleted almost to extinction. Some researchers have theorized that the variations in species numbers are due to natural fluctuations. However there is now an overwhelming consensus in scientific circles that on a global scale the fisheries are in crisis and that overfishing by humankind is having a defined impact worldwide. Stevens (1998). Yet the major players avoid recognition of responsibility. By-catch is also a significant problem.

In the waters of the Antarctic, we are witnessing a repeat of mistakes made in the northern fisheries. Along with other species, the dissostichus eleginoides, or Patagonian toothfish, is being hauled from the sea indiscriminately and illegally in spite of international agreements and conventions. Spain, Argentina and Chile appear to be the main culprits, with an estimated 22,000 tonnes of illegal fish taken in 1998 (Christchurch Press 26/1/99). Reporting of illegal catches is an aspect, which needs monitoring. According to the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), probably less than 40% of illegal catch is reported.

Who Is Entitled To Fisheries

It is easy to blame illegal operators and ‘flag’ nations (those countries not covered by agreements and which sell the use of their flag to countries who are party to agreements) but if a meaningful result to control fish stock depletion is to be achieved a global view is necessary. Invited representatives of Third World countries, attending the most recent meeting of CCAMLR in Hobart in 1998, explained that while developed nations may choose to husband food stocks for future generations, for governments of countries with starving people, this is a luxury choice. They, as nations, are in a similar position to the threatened species of fish in that without adequate nutrition they will not thrive.

It has been asserted that most of the illegal catches do not feed starving populations, but in fact are served in fashionable restaurants in Japan and the United States of America (Gladman1998). There are other ways to gain from illegal fishing. Selling the use of a
country’s flag, or allowing illegal catches to be landed and/or processed, brings in substantial amounts of money for cash strapped nations.

Enforcing the Agreements

There are fishers who are motivated by greed alone and these people pose a different problem. In 1998 Australia began legal action against a newly formed Norwegian company set up specifically for illegal fishing (Martin Excel 1998). Parts of South America are also believed to host large, powerful companies of a similar nature outside the law. Excel (1998).

New Zealand is currently patrolling areas of the Southern Ocean by air and has also sent a frigate to the area but, given the vastness of the ocean and the estimated 80 illegal boats operating there, it seems more of a political exercise than an effective one.

Effects of Overfishing

Removal of a species by overfishing may cause imbalances, which impact in ever increasing ways on the food web Stevens (1998). Where a species is displaced it seems that feeding patterns will change. For instance, the diet of the Patagonian toothfish in the Southern Ocean is thought to consist largely of prawns and squid Upton, (27/1/99). Its preferred habitat is in the vicinity of continental shelves, with cold, moderate water currents such as near South Georgia. Further north in the Scotia Sea area where patagonian toothfish have only recently been found (in small numbers) it has been noted that lanternfish are preyed on by large numbers of squid. Normally shelf dwellers, the toothfish, along with squid and the lanternfish live in cold, extremely deep water here, but only the latter two species can rise up into the swifter currents to feed at night. The patagonian toothfish appear to be unsuited to this setting with its stronger currents and warmer surface waters than their usual habitat. Nets have needed to be lowered to depths greater than 100 metres to catch the squid. It seems that because the toothfish are not fully adapted to this environment their consumption rate of squid is less than the squid’s growth rate. The squid are very strong swimmers and can move up and down the water column quite readily. The lanternfish by rising up to feed at night expose themselves to the predication of the squid. Because the toothfish cannot swim as well in the strong currents they tend to stay near the bottom and so do not kill enough squid to maintain an equilibrium between the species. Numbers of toothfish are not known in these waters but there are reports of a large increase in the numbers of squid Pain (1995). The squid are now a targeted fishery.

Government Involvement in Overfishing

In his Antarctic Futures meeting address in Christchurch 1998 Stan Crothers, Deputy Director of New Zealand’s Ministry of Fisheries reported that fishers have recently spent $124 billion to catch $70 Billion worth of fish. The difference of $74 billion was from
subsidies and loans from governments. These subsidies encourage overfishing. If the fishers had to make a living unassisted they would take more care of their fisheries. As it is they are not compelled nor even encouraged towards conservation.

Flow On Effects

The effects of depletion of whale, seal, penguin and other southern species have been covered in the historical section (Paton 1999). We are now seeing some flow on effects of this depletion and of the whales in particular. Since the reduction in whale numbers, krill which is the staple diet of many whales and is also near the top of the Antarctic food web, has undergone a mass radiation and now appears to be in over supply for seals and other species. Some of these species, particularly seals, have made a remarkable recovery and are reaching sexual maturity earlier. There is a proliferation of crab eater seals to the point that culling has been considered in the islands of the sub Antarctic as their numbers are forcing penguin breeding stock off the beaches. Knox (1999).

Specialized Conditions and Food Webs.

In the Southern Ocean another problem exists. The Antarctic slope water food chain is a comparatively short one largely based on the krill Euphausia superba and squid CCAMLR report (July 1998). There is a much more diverse and disparate range of predators than in the north. These include seals, whales and many species of bird. The common denominators are that all the hunters are oceanic and exhibit searching behaviour and the preference to feed on aggregated prey. Because of the oceanic nature of the area the prey tend to swarm in large numbers Dayton. et al (1994). This makes them an easy target for netting. Nets, which can hold 25 tonnes of krill, are used and fishing can be nearly continuous. Swarms of 150 tonnes of krill are taken in half a day Knox (1998). If krill and squid are overfished it seems inevitable that serious imbalances will flow down the food chain.

Research on Fisheries Depletion

Definitive research on both the life cycles and the effect of harvest on marine populations is sparse unless it is directly related commercial viability. Information flow seems to stop as a species declines to the point of unprofitable harvest. Most records are earlier than 1995. The question begs to be asked is this a policy of the fishing industry or is priority given to searching for yet another viable fishery and a method to utilize it?

An example of this kind of thinking comes from the New Zealand Ministry for the Environment’s website as at 20/02/99. “The Fisheries Act 1966 requires that fish stocks are utilised in a sustainable manner... however the status of more than half the commercially exploited fish stocks is unknown but, of the stocks whose status is known, about ten percent are considered to be below the level of maximum sustainable yield...”
(my emphasis).

Fishing Down the Web

As large, profitable fish are depleted to the point where they are no longer commercially viable, the smaller and less attractive species are targeted. These species tend to be shorter-lived so will be affected more rapidly as their ‘recruitment’ is limited. Recruitment is the term used for the breeding stock, which would normally replenish numbers. Because some modern methods such as biomass fishing tend towards a ‘scorched earth’ effect, all species are taken at any given site leaving no means of recovery. Fisheries specialist at Columbia University Daniel Pauly, believes that, “if we continue in this way we will have a sea full of little horrible things that nobody wants to eat” Hunter (1998). Another method, Bottom Trawling which is employed to trawl the sea floor, leaves a bulldozer-like path of destruction across sensitive ecosystems according to Sylvia Earle, a marine biologist based in Oakland California.

BY-Catch

Still related to the food web is the problem of by-catch, those species not targeted by the industry but killed or severely maimed by the methods used. As most fishing personnel are inconvenience by the unwanted catch and unaware of its significance it is difficult to get accurate estimates of species and quantities. For the purposes of this report it has been necessary to glean material from many sources, some non-scientific, others probably biased, and others which seem too conservative. Under these circumstances the best approach appears to be to give general figures only Knox (1999).

Vanishing Species

In North America’s Atlantic seaboard, in the 1950’s, barn door skate were unintentionally caught to the extent that their 600,000 numbers were reduced to 500 in twenty years. None are found today. Also in the Northeast Pacific it is feared that seven-tenths of the zooplankton will be destroyed by the methods currently employed. As there is a close relationship to the generation of oxygen into the biosphere and the zooplankton, major atmospheric changes could take place Hunter (1998). In the Southern Ocean zooplankton form a major food for krill.

Elisabeth Mann-Borgese, chairman of the International Ocean Institute in Halifax, is convinced that humans are the cause of the dying out of marine species. In her view we are killing ourselves by killing the oceans. Support for this view comes from Federal Minister of Fisheries and Oceans David Anderson, in the U.S.A., “we have a major crisis in the oceans,” he says. “If we don’t start taking effective measures internationally, we are dead.” Yet it appears that little is being done.
New Zealand initiatives lead the way in the Southern Ocean with research in to methods of longline bait emplacement capsules whereby the bait sinks to a safe level before being released. Research is in the initial stages but the methods seem to be effective. (Barnes and Walshe (1997) also Smith and Bentley (1997).

Examples of By-Catch

In the Southern Ocean by-catch includes many species, which were slowly recovering from the devastation carried out in the late nineteenth and early this century. This includes fish, seals, penguins and many species of sea birds. Research on by catch in the krill fisheries has shown that large numbers of the icefish *Champsocephalus* are accidentally caught off South Georgia. These are young breeding stock so pose a serious threat to the species. (Everson et al' (1992)

One of the bird species to suffer major losses at present is the wandering albatross. Longline fishing for blue fin tuna, where an estimated 50 million hooks are set each year, is the main culprit. Donoghue (1997). The 130 kilometre lines are paid out behind the moving vessel. Because the bait is frozen it tends to stay, initially near the surface. This is the preferred food of albatrosses. They dive on it and are hooked, being dragged down by the momentum of the boat and drowned. The total wandering albatross population has been set at 100,000. Satellite tracking confirms that every year 10,000 are killed as by catch and are mainly females, hooked as they forage for food for their chicks. The male parent has a feeding ground closer to the nest site where, although there is less food, there is also little danger from these fishing boats. The males, both adults and immatures, are in danger from another source, the Russian Patagonian toothfish longliners cruising close to the continental shelf near South Georgia. Officials report up to 8 seabird deaths per day. Grey Petrels, which migrate to New Zealand, are also affected and reach there with a ratio of 16 females to 1 male. In the harsh environment of the Southern Ocean a single parent cannot raise a chick. When one parent dies so does the chick. Harper (1996)

Effects of Fishing Boats and Humans in the Antarctic.

There are many as yet unquantified affects from the presence of fishing boats and humans in the area. The dumping of discard, offal, kitchen waste, by-catch and unused bait add irregular and extraneous material, affects the food web. Fuel pollution, whether used or spilled, is detrimental to all organisms to a varying extent, as are plastics and lost fishing gear. Harper (1996). There is no effective control on landings in the area and the possibility of damage to sensitive nesting and roosting sites is very real.

Taking krill and squid from near a breeding colony forces the birds to forage farther and therefore to use more energy. In some cases birds travel thousands of kilometers before returning to the nest. Also the longer that they are away from the chick(s) the more
exposure there is to the predications of scavengers. Currently there are 200 nautical mile economic zones around some islands but these are ineffective if the birds are forced to forage so much further afield. Another well meant recommendation, which has problems, is related to reducing the by-catch of albatross. This recommends that longlines should be laid at night. While this may help the albatross, it increases fatalities of the White Chinned Petrel, which is nocturnal. It is now suggested that no fishing should take place when the moon provides enough light for the petrels to see the bait Donaghue (1997). Given that at 60 degrees south where the fishing takes place, there is no night for many months of the year the worth of this recommendation is questionable.

On a positive note, in New Zealand the Ministry for the Environment is aware of the need for an integrated approach to environmental management and in considering connections between different aspects in the fisheries issue. (Ministry for the Environment website 20/02/99). In depth research under the auspices of CCAMLR, on the relationships of predators (including mankind) in the food web is valuable. After the establishment of the Ecosystem Monitoring Programme (CEMP) this approach was proved effective when mass deaths of Adelie penguin chicks at Beechervaize Island in January 1995, were attributed to a natural phenomena rather than the result of fishing, as no krill fishing had occurred near that site. (Kerry, et al. 1995), in Agnew (1997). It is important that balanced research such as the above, showing effects other than human induced are taken as part of the whole ecological issue.

However the reality at sea is that if a trawl brings up a number of species other than the targeted fish species and the trawl is deemed uneconomic to land, then the net is cut and the whole catch is dumped back into the ocean. Most fish will already be dead or severely maimed. (Swanson 1999)

Conclusion

The Southern Ocean is a complex and poorly understood habitat. This lack of understanding needs to be addressed urgently if the mistakes made in the northern oceans are not to be repeated in the southern oceans. Research on how species can be fished without overfishing needs to be ecosystem based, not commercially driven. People must realise the old belief that the oceans are so vast that we cannot harm them is false. Already irreparable damage has been done. It is imperative that those with the knowledge and understanding of the problem do what is necessary to inform those who are perpetuating it. This includes the whole of humanity. After all, if we did not catch the fish there would not be depletion of fish stocks. **Fisheries depletion is an inditement of Humanity.**

*Since this information was gathered Greenpeace has released news that it has found and pursued a vessel, illegally fishing in the Southern Ocean, which it believes is the Belize, registered as Salvora. This is the vessel sued by Australia in 1998, and previously mentioned under 'enforcing the agreements.' The result of the Australian litigation cost the fishing company over A$1.08m. Christchurch Press 6/3/99*
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