



## The sustainable management of fisheries

### Introduction

The world's fishing industry currently employs around 200 million people. These include fishermen harvesting the seas and oceans, fish farmers involved in aquaculture and industrial workers manufacturing fish products. In 1999 the total world harvest of fish was 110 million tonnes. Thirty million tonnes was used to make fish oil and fish-meal and about 80 million tonnes was for human consumption.

### Marine fishing (Figs 1 and 2)

There has been increasing concern that stocks are becoming severely depleted in many parts of the world's major fishing grounds. Recent Food and Agricultural Organisation (FAO) figures show that 35% of the world's fisheries are over-fished. In some parts of the world the situation is particularly serious, such as the North West Pacific area. The Herring Fisheries of the North Sea are now merely a legend as are the cod fisheries of the Grand Banks off the coast of Newfoundland. For too many years too many fishing vessels have been catching too many fish with little thought for future supplies. The FAO believes that at least 60% of the world's fish resources, including the whole range of commercial fish species – cod, hake, shrimps, sharks etc. are in urgent need of a more sustainable management scheme (see Table 1).

### Sustainable Management

Sustainable management involves the control of fishing activities in such a way that 'the needs of the present are met without compromising the ability of future generations to meet their own needs.' Humans must reduce the numbers of fish caught and only take out of the oceans what can be replaced by nature.

#### ● Reducing the numbers of fish caught:

The numbers of target fish, (the species that will be sold) in the 'catch' should not be greater than the natural growth in numbers of that fish (the maximum sustainable yield). If possible the 'catch' should be lower, to allow target fish populations to recover to healthy levels (the optimum sustainable yield).

Fig. 2 Graph showing the top fish producing countries in 1998.

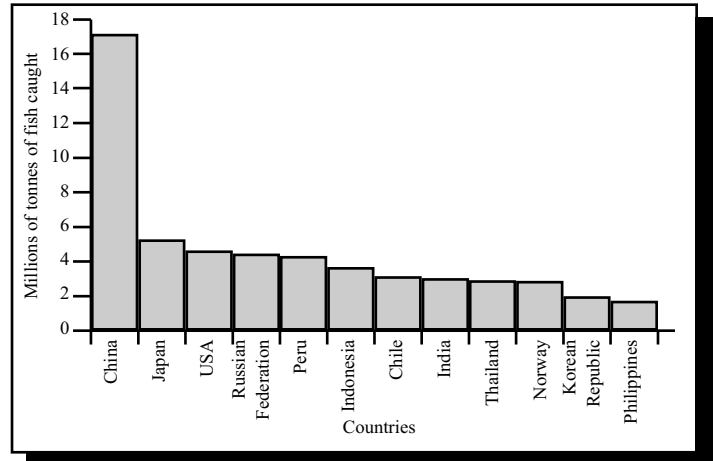
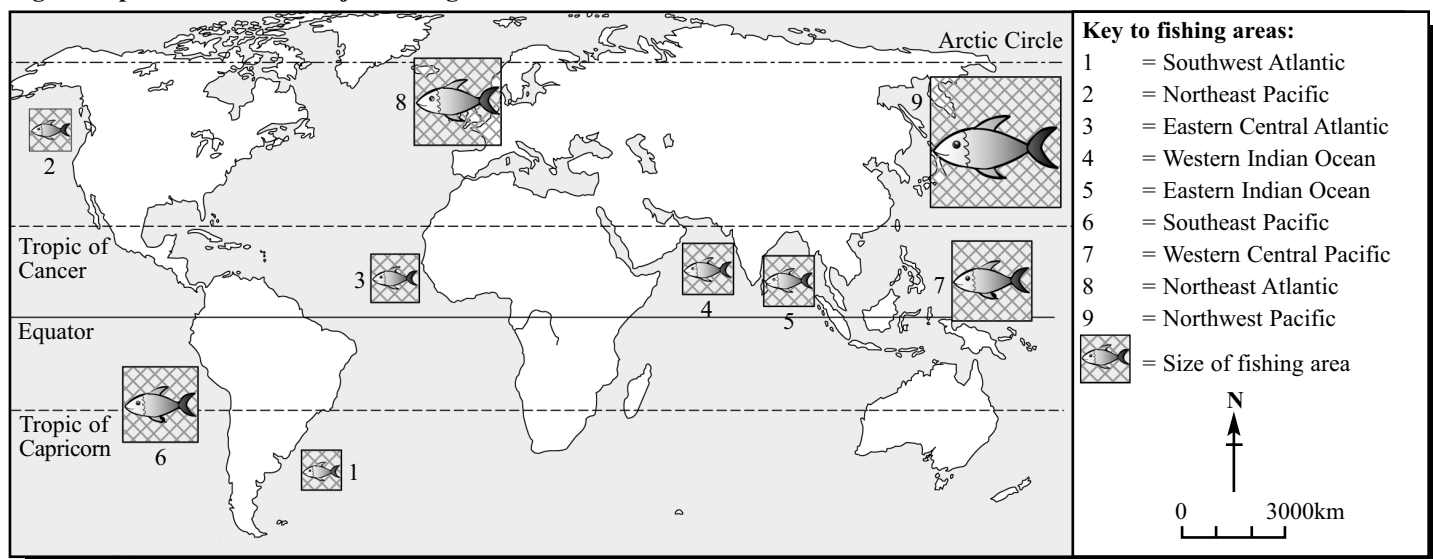


Table 1. Fish Catch -1996 and 1998.

Type of fish	Fish caught in millions of tonnes)	
	1996	1998
Yellow fin Tuna	11	17
Blue Whiting	6	12
Atlantic Cod	13	12
Largehead Hairtail	13	14
Anchoveta	85	17
Skipjack Tuna	16	19
Chub Mackerel	22	19
Chilean Jack Mackerel	43	20
Japanese Anchovy	13	21
Atlantic Herring	23	24
Alaska Pollack	45	39

Fig. 1 Map of the world's major fishing areas.



There are many ways in which sustainability can be achieved:

- *Quotas can be set for countries and/or fishing fleets to limit the total catch to the sustainable sizes recommended by world authorities such as the FAO.*
- *Harvest taxes can be collected on the catch.*
- *Community management schemes for fishing areas can be set up. In these schemes, local fishermen control fishing operations in their area and so if they over-fish they are damaging their own future livelihoods.*
- *Bans can be imposed on fishing activities at certain times of year, such as during the breeding season, to ensure the replenishment of stocks.*
- *Access to fisheries can be restricted, by setting up exclusion zones that are off-limits to certain nationalities.*
- *The positions of fishing fleets can be closely monitored using satellite technology to ensure that no one is fishing in forbidden waters.*
- *The size of fishing fleets can be reduced. The FAO estimates that the cost of operating the world's fishing fleets is 54 billion dollars more than the revenues from the catch!*

The reduction of fishing fleets can be carried out in several ways:

- *By limiting the numbers of licences issued to fishing boats. This has already started in important fishing areas such as Canada, the USA and the former USSR.*
- *Governments can set up 'buy-out schemes' or decommission fishing boats.*
- *By reducing the number of government subsidies given to fishing fleets. Each year 54 billion dollars are given in fishing subsidies. Many governments give subsidies to support local economies, e.g. in remote parts of Scotland. In some countries fish are an important food or a useful source of export earnings, and so are subsidised by the government. Some governments even give subsidies to win votes! If subsidies were reduced and the money used on buyout or retraining schemes for fishermen, the efficiency of fishing fleets could be greatly improved.*

#### ● **The implementation of Sustainable Management Schemes:**

Some countries are more reluctant than others to work to sustainable guidelines established by international authorities. Since 1970 all countries have an official 200-mile exclusive economic zone, (EEZ), in

which only they are allowed to fish. Outside these areas, known as the High Seas, there are less restrictions and a lack of sustainable management there has led to severe depletion of stocks. An agreement aimed at limiting fishing in these areas was drawn up in 1995 and signed by many leading nations. However, as stocks become reduced within a country's own territorial waters, more fishermen are tempted into the high seas. There is also a certain amount of illegal fishing under flags of convenience: countries like Belize and Honduras become havens for industrial fishing fleets, many of which ignore international standards.

Over-fishing is also not only due to the operations of large industrial fleets, as about half is linked to subsistence fishing in LEDCs. There are obvious problems of reducing the numbers of fish caught in such areas as it would affect the food supply of local people, some of whom are already living on the brink of starvation. The expanding population of many tropical countries has put pressure on fish stocks.

#### ● **Maintaining an ecological balance in the oceans:**

Fishing activities should also involve the maintenance of the marine ecological balance and should be focused on catching only the target fish. **By-catch** species, (caught but not used), should be kept as low as possible. Up to 15,000 dolphins, whales and other sea-animals die needlessly in this way, every year. The use of drift nets, which catch many species other than the target fish, has been banned in many areas, reducing the by-catch and helping to maintain the marine ecological balance. The size of mesh of the nets is another crucial factor.

In the North Sea one third of the catch are sand eels, which are used to make fish meal and margarine. However, sand eels are a vital food of cod, haddock, sea mammals and birds. They are an important part of the food chain but as yet there are no restrictions on the size of the catch. Since 1996, groups such as Greenpeace have lobbied for the halting of such industrial fishing in the North Sea and have targeted food companies. Some firms, e.g. Sainsbury's, Unilever and McVitie's, have phased out their use of fish oil products.

#### **Case study: the fishing industry of the UK**

*The UK, as a member of the EU, is controlled by the Common Fisheries Policy (CFP) set up in 1982. Under this policy, each member country has a six-mile limit where only its own boats can fish and then there is a 12 mile limit of restricted access for certain EU members in nearby waters. The EU has made several attempts to manage its waters in a sustainable way and to reduce over-fishing problems.*

1. *Every year a quota is set for the amount of fish each of the member states is allowed to catch within its 12-mile limit fishing grounds. These quotas are compatible with sustaining fishing stocks in EU waters. Due to declining fish stocks in the last two years, UK quotas have been cut by 60%. Quotas may be set, but in reality it is very easy to avoid keeping to them. e.g. fleets can catch more than their quota and then sell it illegally at small ports as 'black fish'.*
2. *The CFP aims to reduce fishing activity by compensating boat owners who stop fishing. Often though, the boats involved are old and inefficient and so there is only a small reduction in the fish catch.*
3. *The CFP policy also regulates mesh and net sizes to prevent young, immature fish from being caught, helping to preserve future stocks. Cod should live up to 20 years but more than 90% are being caught before the age of four and few reach the age when they can start to breed. Only fish of a certain minimum size can be legally sold. However, in practice, those that are too small are usually just thrown back into the sea.*

*The EU has also taken measures against the use of drift nets to reduce the amount of by-catch.*

*The policies and principles of the CFP are very good but costly to put into practice. The total value of fish landed by UK vessels is £ 500 million but it costs 55 million to enforce the relevant legislation.*

*In 2001, a new £22.5 million package of aid to the UK fishing industry was announced, including sustainable management measures. This was a joint EU and government scheme. £11 million is to be used to improve the quality and value of fish caught, and promote the use of environmentally friendly fishing gear. £6 million is to be used for decommissioning fishing boats. £5.5 million has been set aside for retraining and rejuvenation at ports such as Hull and Newlyn. A recovery plan for key stocks of hake and cod is to be set up and catches are to be cut by half in the next 12 months. An area of 40,000 square miles was closed to fishing from February 14 to April 30 in 2001, during the spawning season, to enable fish stocks to recover.*

*There was publicity for the problems of the fishing industry in a newspaper article on October 24 2001. This stated that cod stocks in the North Sea were at their lowest recorded level for 30 years, having dropped from 1 million tons in 1970 to 54,000 at present. In response to this announcement, Bird's Eye has said that it will no longer use cod to make its fish fingers, as it has for the last 50 years; instead it will use other white fish that are not threatened.*

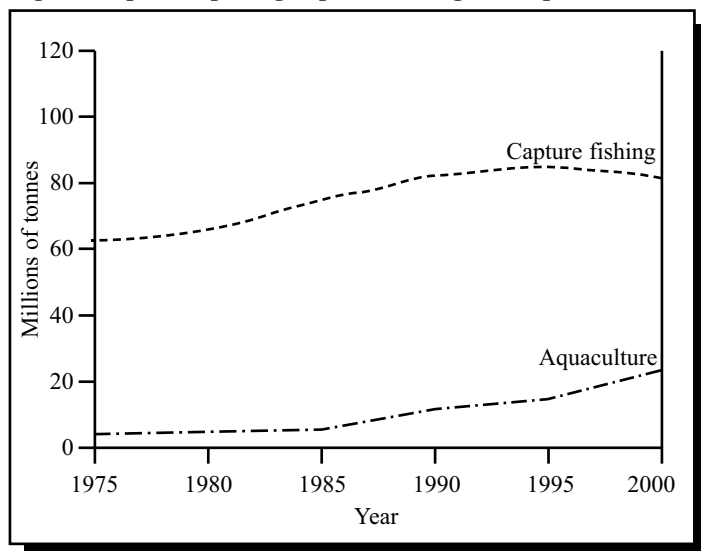
### ● Using Customer Pressure to encourage Sustainable Management:

Recently a scheme aimed at using 'customer power' to achieve sustainable management in marine fishing has been established. The Marine Stewardship Council, an independent, global, non-profit organisation, was set up in 1997 between the World Wildlife Fund and Unilever (the world's largest buyer of seafood) to promote 'sensible fishing practices' world wide. It aims to 'harness purchasing power to generate change and promote responsibility for the fish as a food source'. It has developed an environmental standard for fishing areas, referring to healthy fish stocks, ecosystem preservation and sustainability issues. If an area meets the criteria laid down it can then put a label on its food. Alaska's Salmon Fishery was the first to be given this award in 2000. Now four such areas, including a small cockle fishery in Wales in 2001, have been given them. If customers can be encouraged to buy fish from areas where sustainable management methods are practised, it will perhaps discourage other methods of production.

### Fish farming ( aquaculture): is this the answer?

Approximately one quarter of the fish we eat comes from farmed sources. China produces one third of this amount and is the only country where the production of farmed fish is greater than that of caught fish. In the USA one half of the shrimps, one third of the salmon and nearly all the trout are farmed. Aquaculture is thus a growing activity (see Fig. 3). There has been a big increase in commercially intensive aquaculture and companies have been set up in LEDCs as part of national government policies. In some LEDCs, a 'Blue Revolution' has occurred, similar in significance to the earlier 'Green Revolution' in farming.

Fig. 3 Graph comparing capture fishing and aquaculture.



Aquaculture was seen by many, at first, as a solution to the depletion of fish stocks and the rising demands for fish by an increasing world population. However, there are many drawbacks and disadvantages to this type of fish production:

- Fish farms produce a great deal of waste material. Uneaten food falls to the bottom of the ponds and rots. This is often released directly into the sea creating pollution and potential health risks, such as the recent *pfisteria* outbreak on the east coast of the USA. Some areas have tried using biological filters such as mussels, seaweeds and oysters as a natural solution. The waste could also be used as a fertiliser for crops, the polluted water could be re-circulated instead of put into the sea, or farms could be sited where there are strong enough currents to remove the waste from the local coastal area.

- Many farmed fish are carnivorous species and to feed them means catching more fish than are actually produced on the farm. To produce one pound of salmon takes 3 to 5 pounds of wild caught fish! More sustainable management could include raising herbivorous species such as catfish, carp and oysters and / or using feed with a lower fish-meal content.
- Building the farms takes up large areas of natural coastline in tropical countries, e.g. mangrove swamps, which provide an ideal environment for aquaculture. Fish farms have been responsible for the destruction of 10% of the world's mangrove areas. These mangrove areas are natural breeding grounds for many types of fish and shellfish and also act as a water purifier. Once destroyed, these coasts are exposed to erosion and flooding of the villages. In Thailand, 70% of the Mangrove swamps have been destroyed, which is a major problem as it takes 50 years for the forests to regenerate.
- Salt water in the ponds can seep through the ground into the water table polluting drinking water supplies. It can also flow onto nearby subsistence rice farms damaging the crop.
- Local people can also be forced to sell their land, often at low prices or have their access to the sea, and thus their fishing activities, blocked.
- Large amounts of antibiotics are used in the treatment of fish diseases and pesticides are also used. These add to the pollution of nearby waters.
- Farm-bred fish can escape and the introduction of these non-native species, bred for commercial purposes, into a natural ecosystem can be very harmful. Native fish can be killed, the farm species can take over, or if they breed the genetic make – up of local fish can be altered.
- Many wild birds are attracted to fish farms as a source of food and are killed by the farmers. Around 12,500 birds are destroyed in this way each year in the USA.

### Conclusion

The responsible and sustainable management of the world's fisheries for the benefit of future generations is of the utmost importance. The methods involved may result in considerable changes for some fishing communities. However, the rebuilding of healthy stocks could add another 20 million metric tons of high value fish to the annual harvest - a useful contribution to the feeding of our growing population.

Aquaculture will have a part to play in the fishing industry of the future but also has many problems that need solving at the moment. It is to be hoped that man has not left it too late, and that by tackling the problems of today, there will be a fishing industry left for tomorrow.

### Websites

- <http://www.acm.org/crossroads/xrds4-1/fish.html> A sustainable fishing simulation game.
- <http://globalsustainability.org/Education/Definitions/> list of definitions
- <http://www.oneworld.org/ni/issue325/facts.htm> for facts on fishing
- <http://www.fao.org/DOCREP/003/X8002E/x8002e04.htm>
- [http://www.wwf.org.uk/News/n\\_0000000107.asp](http://www.wwf.org.uk/News/n_0000000107.asp) details of WWF report on Plans for the recovery of the UK fishing industry

### Acknowledgements

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