

20. EXTERNAL CHALLENGES: CLIMATE CHANGE

20.1. Climate change

Besides external challenges in the realm of environment (as dealt with in Chapter 8) and of economic developments such as the volatility of fuel prices or the recent financial crisis (as discussed in Chapter 2), another external challenge of major importance is climate change.

Climate change and fisheries interact reciprocally:

- Industrialised fisheries contribute to climate change through emission of greenhouse gasses. The fisheries sector must therefore take its share of contributing to mitigation.
- Fisheries are affected by climate change because the resource bases for fisheries, the marine ecosystems, change. The fisheries sector and public policy must therefore adapt to climate change.

20.1.1. Fisheries impact on climate and contribution to mitigation

Fisheries are responsible for 1.2% of global oil consumption. The consumption of oil is very variable, dependent on the fishery. The global average is 0.45 kg fuel per kg fish landed (640 l/ton). European fisheries do however, amongst its many diverse fisheries, have some of the most oil consuming fisheries globally - it can be 4 kg fuel per kg fish landed in beam trawl fisheries.

There have been low incentives for the industry to develop energy efficiency. On the contrary, the tax exemption for oil to fisheries can be considered a subsidy to the sector which has had the opposite effect of being a counterincentive for energy efficiency and reduction of CO₂ emissions. The emergency sense of crisis in situations of high fuel prices (as has occurred a number of times over the last 10 years) shows the industry's sensitivity to this input – and as it appears high fuel prices have created a strong incentive for change.

Reaching MSY levels of fishing pressure with improved economic performance of the fleet (by a reduction in fleet capacity together with healthier stocks) will also result in improved energy efficiency because a smaller fleet will harvest from larger fish stocks.

Mitigation of environmental effects in the sector is primarily promoted through the general mitigation policy of the Community. Beyond this, energy saving technologies and practices are promoted by the Commission. There is considerable potential for reducing the emissions relative to landings. There is potential for energy savings of up to 20% on average by improving vessel and gear design and operation.

The Commission facilitates information exchange on energy efficiency through a study and a web site with information available to operators in the sector.

20.1.2. The impacts of climate change on fisheries

The impacts of climate change on fisheries are expected to be *very considerable and* complex. The major features of expected changes start to be better known but the detailed changes are still not predictable and will probably not be predictable as changes develop further.

The main effects are:

- The most direct effects are *changes in distributions* of fish stocks – there are already northward shifts of populations, but this is not possible in enclosed basins such as the Baltic and the Mediterranean and the impact in such basins may therefore be more pervasive. In the Arctic a poleward shift in distribution of fish stocks is expected.
- There are also many indirect effects resulting from changes in the availability of food organisms, changed oceanographic conditions and increased acidity. These indirect effects may amount to *regime shifts* where the basic fabric of the ecosystem changes and the conditions for different species change much more than expected from temperature changes alone. Such effects may be dramatic – also for fisheries - but are presently poorly known. The net balance of these effects is, as a result, difficult to predict for specific fisheries. As an example the regime shift in the Baltic is referred to in chapter 19.
- The environment for fisheries will be continuously changing in the future -and more rapidly and dramatically than before. What is also new, with regard to earlier changes in the marine environment, is *that the change predicted due to climate change is more rapid than earlier changes* within the most recent several thousand years.
- Climate change is an added stress on fish populations and is also associated with important environmental changes such as changes in acidity of the oceans which is caused by the increased concentration of carbon dioxide in the atmosphere. This means that *marine life, including fish populations, will need to adapt more rapidly and to several stresses simultaneously*. For exploited fish populations, high exploitation rates must be added in addition to the stress of changing marine ecosystems, changing temperatures and increasing acidity. Thus, fish stocks will be more sensitive to fishing in general and overfishing in particular
- In the Arctic there will be accesses to resources which were not available before as a result of reduced ice cover.

It is a challenge to both industries and public policy to adapt to this.

Industry adaptation

- From an industry perspective, more rapid changes in the resource base and cautious management, means that the industry needs to develop its flexibility even further in order to adapt to new conditions.
- The need for flexibility and a changing resource base may, on the other hand, discourage long term investments. A longer investment horizon to encourage the industry to take a longer term responsibility so this may counteract these attempts must be part of this strategy, and should be promoted.
- The industry may be facing new mechanisms to distribute access as the geographical distribution of stocks change.
- Existing access rights may change considerably in value as the volume (and thus value) of a stock changes as a result of climate change.

The adaptation of public policy can be considered fourfold: 1) rebuild and maintain resilience of marine ecosystems and fish stocks, 2) ensure that adequate measures will be taken as changes appear by developing a responsive and responsible decision framework; 3) prepare response to distribution issues as fish stocks change distribution or new fishing opportunities appear and 4) develop fisheries policy in coherence with maritime policy developments

1. Rebuild and maintain resilience of marine ecosystems and fish stocks.

- Climate change is an added stress on marine ecosystems and fish stocks on top of fisheries, pollution etc. Climate change therefore makes the need to reduce fishing pressure even more urgent
- The first priority is therefore to do effectively what we try to do already to move to sustainable fisheries – to reduce overall fishing pressure and reduce capacity

2. Ensure that adequate measures will be taken as changes appear by developing a responsive and responsible decision framework

- Climate change has highlighted that we have been operating within a false paradigm of nature being constant - climate change and considerations of ecosystem linkages require management to be adaptive in a changing environment.
- Proper monitoring and scientific analysis needs to be in place which enables early warnings of changes and also of regime shifts. However, warnings about regime shifts are very difficult to get because science does not have good methods to identify such shifts in the early stages.
- Management plans must be drawn up in a way that they are adaptive, a trend introduced with most recent plans. The background paper for the

new cod recovery plan (adopted in 2008) did specifically take account of the changing environment as a reason to propose a new approach.

- A need to develop a responsible and responsive decision process which does not lead to complacency in times of little change and can react rapidly when required.

3. Prepare response to distribution issues as fish stocks change distribution or new fishing opportunities appear.

- Questions of distributions of access will be raised in international fora as the geographical distribution of stocks change. Decision rules are needed for this early on, preferably before the changes in the sea have taken place. In general access is based on historical precedence of catches rather than geography, a concept that will come under pressure under climate change.
- Another case is "new" stocks, when fish species occur in areas where they did not occur before. This creates the risk of the development of unregulated fisheries and early measures need to be taken to manage emerging fisheries – it is difficult to reverse overfishing. Mechanisms which introduce regulation (and distribution of access) in such cases should be established timely.
- The increased access in the Arctic due to reduced ice cover is a specific case of 'new' resources becoming available to fisheries which needs mechanisms to distribute access.

4. Develop fisheries policy in relation with maritime policy developments.

- The fisheries policy needs to be integrated with maritime policy in general, especially in relation to spatial planning of activities, environmental policies and data and research.
- In the Arctic specifically, development of fisheries as stocks are distributed more northern needs to be integrated with the development of other human activities in the Arctic including shipping and mineral resource extraction.