# The fishery conservation policy of the European Union after 2002: towards long-term sustainability

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In December 2002, changes were introduced in the Common Fisheries Policy (CFP) as part of a longer-term reform process. Although implementation of these changes is gradual, experience over the past 3 years has already provided some lessons. This paper summarizes the main elements of the reform, describes the progress in their implementation, draws some provisional conclusions, and highlights the main scientific challenges in relation to implementation of the revised CFP. The adaptation of the scientific advice to changing needs, the difficulty of changing the tradition of managing stocks through annual decisions, and the development of a fruitful dialogue among fishers, scientists, and managers are the main challenges still to be resolved to ensure effective implementation.

**Keywords:** CFP reform 2002, multi-annual management, quotas, scientific advice, TACs.

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## Introduction

Since the inception of the Common Fisheries Policy (CFP) in 1983, the conservation policy of the European Union for marine resources has rested on two pillars: single-stock annual catch limits and technical measures; these pillars have remained essentially unchanged for nearly two decades. However, the state of affairs changed in 2002, when a major reform of the CFP in general, and of conservation policy in particular, was adopted by the Council of Ministers.

The new conservation policy within the CFP has been implemented gradually since 2003. Here, I describe the main elements of the reform, discuss the progress in their implementation, and draw initial conclusions on the main lessons learned so far.

## Conservation policy before 2002: a diagnostic

The European Commission (CEC) elaborated a diagnostic of the policy existing since 1983 at the time the CFP was reformed (CEC, 2001), following extensive consultation with stakeholders around Europe. In its Green Paper, the CEC recognized that the conservation policy could not be considered a success in light of the generally poor status of conservation of fishery resources in Community waters. The main reasons behind this failure were:

- overcapacity of fleets relative to the resources available and ineffective enforcement of fleet policy;
- insufficient enforcement of the regime of total allowable catches (TACs) and quota;
- weaknesses and uncertainties in the scientific advice;
- lack of participation by stakeholders in the decision-making process, resulting in poor commitment of fishers to the measures imposed;
- focus on short-term management measures (TACs), often ignoring scientific advice;
- deficient integration of the environmental dimension into policy-making.

It must be stressed that the TAC and quota system, the cornerstone of the conservation policy, was established at a time (1977–1983) when overfishing was considered relatively unimportant. The system was conceived primarily to allocate fishing rights in terms of fixed shares of the agreed TAC (i.e. quotas), rather than to manage overexploited stocks (Holden, 1994). The situation at the beginning of the 21st century, however, is quite different, with most demersal resources in Community waters being either outside safe biological limits or overexploited in terms of long-term sustainable yields.

These were the main reasons that the CEC proposed a number of changes to the conservation policy, in the context of reform of the CFP. The reform materialized in December 2002 when the Council of Ministers adopted a new basic regulation (CEC, 2002a). Although the reform affected other aspects of the CFP (such as fleet policy, control policy, and governance), only those referring to fishery management measures are considered here, with an emphasis on the relationship between the scientific advice and the fisheries management regime.

## Reform of 2002

CEC (2001) regrouped the basic management instruments available, placing special emphasis on the conservation policy, the control policy, and governance. Some of these instruments were

not entirely new and could have been applied before. However, the regulation emphasized, and provided a legal basis for, some new main elements of CFP. These are described in the following sections.

## Recovery and management plans

Management decisions had been concentrated on short-term (TAC) considerations, ignoring the need for a multi-annual strategy that could ensure the long-term sustainability objective of the CFP. CEC (2002a) enshrined multi-annual plans as the main management instrument for the future. Two types of plans were distinguished: recovery plans (Article 5) for stocks outside safe biological limits, and management plans (Article 6) for stocks inside safe biological limits. This arbitrary distinction was drawn because of the lack of agreement on the general use of effort limitation as an instrument for managing fish stocks. By distinguishing between recovery and management plans, the Council reserved the application of effort management for more serious cases of overexploitation. The intention is to develop such plans for all stocks in Community waters gradually, with recovery plans for severely depleted stocks seen as a priority.

## Effort limitations

In recent years, ICES has consistently indicated that setting a TAC is not sufficient to limit fishing mortality on many stocks and has recommended that effort management be applied in those cases. The CEC has followed this advice, and effort management is now to be used in the context of recovery plans unless such measures are not necessary (Article 5).

The use of effort management is not new. Several regulations established effort management systems before 2002, but they were intended to preserve the *status quo* in specific fisheries regarding overall effort by area, rather than to serve as a tool specifically to manage certain stocks. The reference to effort management in recovery plans (Article 5) establishes the basis for systematic use of this instrument in cases where significant reductions of fishing mortality are required.

## Governance

In addition to the existing Advisory Committee for Fisheries and Aquaculture that had been advising the CEC, the Council established new fora on a regional basis, to allow participation by stakeholders in the decision-making process. These Regional Advisory Councils (RACs) are advisory bodies, and their opinion is requested on all proposals made by the EC (Article 31). Specific rules for the geographical establishment of the RACs were subsequently established, as well as for their procedures, structure, members, functioning, and financing (CEC, 2004a). These rules enshrine mutual coordination among RACs and the production of an annual report to the EC. The Council foresees the establishment of seven RACs, covering the main Community areas and fisheries. The rules for their composition ensure the representation of a wide variety of societal interests, from the catching sector to environmentalists and consumers.

## Mixed-fishery management approaches

The TAC system, based on single-stock approaches, fails to account for interactions between different stocks caught together in the same fisheries. As a consequence, continuation of fishing for one species may undermine the conservation target for another and lead to increased discarding. CEC (2002b) emphasizes the need to weigh mixed-fishery considerations, particularly in the context of long-term management plans. In addition, mixed-fishery considerations should also be included in setting annual TACs, and proposals to that effect have been included since 2003.

## Incorporation of environmental objectives

Although the CFP already included several measures with an environmental objective, the reform of 2002 placed special emphasis on the integration of environmental issues into policy. The objective (Article 2) has become, "to ensure exploitation of living aquatic resources that provides economic, environmental and social conditions...". Therefore, environmental considerations are no longer a stand-alone issue, but rather permeate the entire CFP and significantly influence the objectives defined. Beyond the more obvious aspects of integrating environmental and fishery policy, such as the need to protect marine habitats or endangered marine bycatch species, consideration of environmental issues also requires the long-term development of the notion of an ecosystem approach to fisheries management.

## Other elements

Other important elements of the 2002 reform process have been included in separate documents or initiatives. Although these elements are not specifically cited in CEC (2002a), it is clear that they represent an integral part of the same package of measures to revamp the CFP.

### *Improving the scientific advice*

The revised CFP also needed a reform of the scientific advisory process, first to improve the quality of the advice, and second to adapt the advice to the new requirements (CEC, 2003a). The main proposals to achieve this were: (i) incorporating knowledge existing within the fishing industry in the scientific advice; (ii) improving coordination between the CEC, research institutes of member states, ICES, and other regional scientific organizations; (iii) concentrating resources on topics of greatest management interest and urgent questions; (iv) establishing a suitable range of assumptions about policy in preparing scientific advice; (v) obtaining rapid answers for urgent management matters by convening *ad hoc* meetings of scientists if necessary; (vi) improving data collection programmes and catch statistics; and (vii) increasing the resources allocated to fisheries science and advice.

Regarding the quality of advice, data quality is seen to be a critical factor and, therefore, the data collection policy (CEC, 2000) plays a key role. A proposal for a new data collection regulation is being prepared with the view to improving and updating the database for fisheries science. In addition, the EC has established new procedures to reinforce the contribution of National Fisheries Laboratories to the advisory process and has reinforced the potential for the Scientific, Technical, and Economic Committee for Fisheries (STECF) to complement the advice provided by ICES. The EC has introduced adjustments in the biannual EC/ICES Memorandum of Understanding to ensure that the advice provided by ICES matches the new management instruments; the EC has also mandated the STECF to complement ICES work on topics such as effort management, mixed-fishery considerations, and long-term management approaches.

### *Managing stocks at maximum sustainable yield*

Although not specified in the CFP reform, the objective of managing all stocks at levels associated with maximum sustainable yield

(MSY) by 2015 has been accepted by member state governments in the context of the Johannesburg World Summit on Sustainable Development in 2002. This objective fully corresponds to the underlying philosophy of the revised CFP, by emphasizing long-term management based on clear, long-term objectives. The objective of economic, environmental, and social sustainability leads to the question of how these three different aspects of sustainable conditions can be achieved simultaneously. Although this complex question has more than one answer, it can be argued that a proper balance may be achieved around the MSY level. From this perspective, MSY can be considered to be an appropriate objective within the new CFP. The CEC has presented a communication on the implementation of the MSY objective by 2015 (CEC, 2006e).

### *Reduction of discards*

An action plan aimed at reducing the quantity of discards has been developed (CEC, 2002b), and the Council has recommended a series of initiatives for the CEC, especially the development of pilot projects, with the cooperation of stakeholders, to investigate innovative fishing practices that could avoid or reduce discarding. These pilot projects could include applying bans on discarding.

### *Use of economic instruments*

CEC (2001) also identified interests in exploring alternative management systems based on relative stability, such as individual transferable quota. However, such alternatives would seem viable only after the basic problem of the imbalance between available resources and fleet capacity has been resolved. The CEC will present a communication with ideas and suggestions for a debate on this issue with member states and stakeholders.

### *Management of deep-sea fish stocks*

Another consequence is that the CEC has to address the new conservation challenges that, despite warnings by scientists, had not received sufficient attention. One of these challenges was the conservation of deep-sea stocks, about which ICES had advised in 2002 that no fishing on stocks take place until scientific information could confirm that their exploitation is sustainable. The Council has adopted two regulations for these stocks, establishing a biennial TAC and quota system (CEC, 2002c, 2004b) and an effort management regime (CEC, 2002d). Additionally, initiatives have been taken in the North-East Atlantic Fisheries Commission (NEAFC) to bring the management of deep-sea stocks in international waters under an international conservation regime. Following an initiative of the European Community, NEAFC has adopted a recommendation for effort reduction by 30%, relative to the highest recent level.

### *Management of eels*

For the first time, the EC has taken the initiative of addressing, at a European level, the management of a catadromous species, the European eel. A plan of action has been published (CEC, 2003b), and a proposal for a management system (CEC, 2005a) is under discussion in the Council.

### *Real-time management of short-lived species*

Another instrument introduced recently is the management of short-lived species on a real-time basis. The annual abundance of these stocks depends primarily on the size of the incoming year class. Because recruitment cannot be predicted before a fishery starts, the new management system provides for a provisional TAC to be decided in December that can be adjusted during the fishing season, based on an evaluation of the size of the incoming year class. This implies some institutional changes, particularly in the delegation of power to the CEC to adjust the TAC without consultation of the Council of Ministers, to ensure a quick decision-making process. It also entails new challenges for the scientific community, especially a need to provide real-time advice under the pressure of time constraints. Sandeel in the North Sea and anchovy in the Bay of Biscay are already being managed under this system.

### *Technical conservation measures*

Technical conservation measures were not substantially modified in 2002, but they are affected by the recent initiative to simplify Community legislation. In this context, they [or more specifically, the revamping of CEC (1998)] are expected to become a test case for the ability of the Community to simplify legislation that is widely considered to be too complex and too difficult to understand and enforce. Technical measures have also entered the debate on the new instruments of the revised CFP. In particular, the fishing industry and some member states have presented proposals for extra effort allocations in exchange for adopting specific technical measures, largely in the implementation of the cod recovery plan. This has led to discussion of the role of technical measures within the general context of effort-limitation schemes.

### *Management of resources in the Mediterranean Sea*

Thus far, the objective has been to raise fisheries management in the Mediterranean to the same standard as in other Community waters. However, in light of specific features of Mediterranean fisheries, the CEC recognized the need for specific instruments. The action plan (CEC, 2002e) contained several proposals regarding management, international cooperation, and legal issues, such as (potentially) a concerted declaration of Fishery Protection Zones by all coastal states of the Mediterranean basin. One element identified was the need to revamp the only conservation regulation on technical measures applicable to that area (CEC, 1994). A proposal to this effect was adopted by CEC in 2003 and, after an extremely difficult discussion in the Council, was recently adopted (CEC, 2006f).

## Experience with implementation and lessons learned

The process of implementing the new conservation policy has necessarily been gradual and slow. In addition, and particularly so for long-lived species, it takes time for any improvement in stock status resulting from better management to become evident. Therefore, it is too early to carry out a fully fledged evaluation of the new policy based on any objective yardstick. Nevertheless, an initial evaluation of the difficulties encountered in implementing the new approach may be provided in those cases where some experience has been gained.

### Multi-annual plans

So far, the Council has adopted four multi-annual plans: the recovery plan for cod (CEC, 2004c), the management plan for northern hake (CEC, 2004d), the recovery plan for Iberian hake and Norway lobster (CEC, 2005b), and the management plan for sole in the Bay of Biscay (CEC, 2006a). In addition, proposals are being discussed in the Council concerning the recovery of sole in the western English Channel and the management of sole and

plaice in the North Sea (CEC, 2006b), and a proposal for the management of Baltic cod was presented during 2006. Within the framework of the bilateral cooperation between the EU and Norway, several North Sea stocks (including haddock, saithe, cod, and herring) are also subject to multi-annual agreements on harvest control rules.

An important lesson learned is that multi-annual plans need to avoid implementing drastic reductions of fishing activity overnight. Fishers need stability, and any plan that causes substantial changes in fishing possibilities from one year to the next will meet fierce opposition, no matter how strong the scientific evidence for drastic measures may be. The cod recovery plan provides a good example. The initial measures to reduce fishing mortality by 65% in 2003, although falling short of the total closure of the cod fisheries recommended by ICES, has been resented ever since by fishers and administrations alike as a catastrophic infringement on their fishing activities. Consequently, any further reductions required to bring about recovery have been strongly resisted. Once a large sacrifice has been made, it becomes extremely difficult, socially and politically, to obtain acceptance for further reductions, even if they are gradual. The need for stability in catching possibilities is illustrated by repeated requests by the industry to set a cap on interannual TAC variations of 15% as an essential element of any multi-annual plan.

Also, the different plans have suffered as a result of the evolution from biomass-based to fishing mortality-based approaches. The objectives of the cod recovery plan were originally based on biomass, both in targets (precautionary biomass level) and annual steps (30% increases). However, the most recent proposals are based on gradual reduction of fishing mortality. The reason for this change is the great uncertainty associated with absolute estimates of biomass, which make biomass-based objectives unsuitable for long-term strategies. However, it is notable that biomass objectives are understood more easily by fishers as well as by managers, whereas fishing-mortality-based approaches remain largely misunderstood by non-scientists. Therefore, the latter approach has been complemented by objectives based on biomass in recovery plans implemented more recently (e.g. Iberian Norway lobster and Bay of Biscay sole).

Another lesson is that people's mindset cannot be changed overnight. Refocusing the attention of managers and fishers from the long-standing practice of annual decisions on TAC to a new practice of long-term planning represents a challenge that will take time and persuasion. Multi-annual plans may need to be adaptive and subject to revision clauses, because stakeholders refuse to tie their hands with objectives that are too far in the future. Even so, it is proving difficult to convince them to support long-term objectives. A two-step approach may be preferable: first to reach a precautionary level of exploitation and, only after this has been achieved, to discuss the long-term objectives. Moreover, the Council itself appears to have occasional difficulties in adopting annual measures that correspond to the multi-annual plan already agreed. Experience shows that as long as the plan does not imply drastic changes from one year to the next, measures are taken without discussion. However, when the agreed plan implies a strong reduction in the TAC, ministers may ignore their previous commitment and seek *ad hoc* solutions, as has been the case in the cod recovery plan.

In trying to develop long-term management plans, the lack of realistic economic scenarios to accompany and complement the biological scenarios provided by ICES becomes more evident than ever. Convincing socio-economic studies are repeatedly requested as an essential condition to the acceptance of such plans.

## Fishing effort

Disregarding the measures to maintain *status quo* effort in national fleets at large, the first real attempt to use effort control as a management instrument was the days-at-sea regulation established to contribute to the recovery of cod stocks in the Atlantic (CEC, 2002f). Since 2005, similar effort schemes have been implemented in the Iberian hake fishery and in the western Channel sole fishery (CEC, 2006c). In addition, the plan for Baltic cod (CEC, 2006d) also includes a provisional effort management system for 2006, pending adoption.

Effort limitation is also applied in the management of deep-sea stocks (Article 4; CEC, 2002d). Member states can issue deep-sea fishing permits to vessels if their aggregate power and their aggregate tonnage do not exceed values of the vessels that in any of the years 1998, 1999, or 2000 have landed more than 10 t of any mixture of deep-sea species.

A basic feature of these schemes is that they have been subjected to last-minute negotiations in the Council, often not supported by scientific data. As a consequence, a series of derogations and special conditions have been introduced without prior evaluation. This situation changed in December 2005, when the Council delayed consideration of derogation requests until data were presented and the STECF could evaluate their likely effects.

Implementation of the cod recovery plan suffered initially from too little information on reference effort levels. Consequently, it was not at all clear what effort reduction might actually be achieved. Only after implementation was STECF (2005) able to estimate the evolution of the real effort in the various fisheries. For Iberian hake, the number of fishing days applied in 2005 does not seem to have been limiting at all in some fisheries. The lesson learned is that any effort management scheme can only be effective if a firm baseline effort has been established that can serve as a reference.

Another important lesson is that allowing extra days-at-sea in exchange for adopting specific (and supposedly restrictive) technical measures has increased the complexity of the management system substantially and has reduced its transparency. The effects of applying measures involving rules on catch composition are difficult to enforce and to evaluate. Allowing such trade-offs is likely to reduce the effectiveness of the effort control system substantially.

A reduction in the number of fishing days does not necessarily translate into a proportional reduction in fishing mortality on the stock concerned because fishers are free to use the available fishing days as they find most profitable. In the case of North Sea cod, the effort-limitation scheme has resulted in a smaller reduction in overall effort than envisaged and no detectable reduction in overall fishing mortality (STECF, 2005). The days-at-sea limits implemented so far have failed to control overall effort, because reductions in some fleet categories have been compensated for largely by increases in other categories. The effects of these shifts are not known, but potentially, they undermine the efficacy of effort management. Moreover, to accommodate special conditions for individual fleets and to meet the need for flexibility, the system has grown overly complex, to the point of being difficult to manage. This makes it almost impossible to evaluate the likely effect of any derogations requested.

## Improvement of scientific advice

One of the main consequences of the reform has been the large number of additional, sometimes detailed, requests for advice from the scientific community, particularly ICES and STECF. The plethora of new topics listed above only add to the more traditional requests, rather than replacing them. Time constraints for providing advice are also increasing, for instance, in relation to derogation requests and within-year TAC revisions for short-lived species. Moreover, the RACs have started to ask additional questions to aid their advisory work. A recent initiative in both ICES and STECF is to open scientific meetings to stakeholders. For example, STECF organized meetings in 2006 that were entirely open to observers.

Because the ICES advisory structure is essentially designed to provide advice annually to a variety of clients and is not sufficiently flexible and adaptable to cope with all these new demands from the EC, the work carried out by STECF is gradually becoming more important.

However, in carrying out their work, the two organizations are essentially competing for the same human resources. To satisfy the new demands, the human resources for carrying out the data collection and other basic research programmes, as well as for providing the advice, has to be increased through the provision of additional financial means.

A second lesson is that a credibility gap still exists between fishers and scientists. Distrust of fishers may act as an excuse not to commit themselves to management measures based on the advice. Bridging this credibility gap would represent an essential step forward. Attempts to integrate fishers in ICES and STECF meetings appear to have been promising and need to be developed further. Such integration, however, must be voluntary for scientists, to avoid situations where the presence of the industry could be prejudicial to their independence.

Additional advice requires additional scientific work, rather than just changing tasks and priorities. However, it would seem appropriate to review, and possibly to revise, the traditional requests. For example, not all advice may really be needed annually. Perhaps the periodicity for certain species can be changed from an annual to a biennial or triennial basis, so saving time that might be used to focus on new priorities.

## Regional Advisory Councils

The North Sea RAC was the first to be established and is already working at "cruise speed". The Pelagic RAC, the North Western Waters RAC, and the Baltic RAC followed. The South Western Waters RAC is not established yet, and the Mediterranean RAC is still struggling with the rules for its composition.

RACs have started to present recommendations to the EC on a variety of issues. Some of these have already been implemented, particularly if the advice is clearly in line with the objectives of the CFP. This has been the case for Pelagic RAC recommendations on developing multi-annual plans for all-important pelagic stocks. Another example is provided by recommendations on issues without a clear conservation aspect, such as the North Sea RAC recommendations on access restrictions for the "Shetland box" and "Plaice box" (CEC, 2005c). In other cases, however, the EC has decided not to follow the recommendations. An example is the North Sea RAC recommendation on the recovery of plaice and sole stocks, because the EC was of the opinion that the measures proposed were not consistent with the CFP objective of achieving sustainability.

The main lesson learned is that RACs and the CEC need to build mutual understanding and trust. RACs have to gain experience in judging the acceptability of their recommendations to the EC, and the EC needs to gain experience balancing the need to preserve the principles of the CFP with the need to incorporate stakeholders in the decision-making process. If enforcement has been, and still is, unsatisfactory in Community fisheries, this is to a large extent the result of a lack of commitment from industry. For commitment to develop, fishers must identify with the measures taken. Probably the best scenario for meaningful cooperation is the preparation of a long-term plan, where sufficient time is available to discuss the long-term targets as well as the strategies needed to reach them.

Another lesson is that RACs have not yet been successful in representing the views of the individual fishers. The sophisticated debate within RACs tends to become dominated by articulate representatives who, in some cases, can appear untrustworthy to fishers as being too far removed from grassroots interests.

## Mixed-fishery considerations

The recovery plan for Iberian hake and Norway lobster, adopted in 2004, is the first example of a multi-annual plan for two stocks that are interlinked in bottom-trawl fisheries. In addition, CEC (2006b) has adopted a proposal on the joint long-term management of sole and plaice in the North Sea. Over the past few years, the CEC has also proposed the application of mixed-fishery considerations in setting annual TACs. However, these proposals have largely been rejected by the Council on the basis of the (quantitatively) weak scientific evidence in their support.

Although the need to develop long-term management plans for stocks exploited in mixed fisheries is not challenged in general, there is strong resistance to any measures that reduce catching opportunities for a stock that is in good shape, based only on interactions with another stock that has a bad conservation status. The idea still prevails that, if a resource is in bad shape, fishers can shift and fish for something else. This is not just a technical issue, but encapsulates the wider issue of how to manage mixed fisheries: based on the most endangered stock or based on an appropriate mix of criteria for each individual species. Although the former approach would seem more precautionary, member states and fishers may not be prepared to accept such an argument.

Regarding the application of mixed-fishery considerations in setting annual TACs, experience shows that the scientific basis for dealing with this issue in a consistent manner is not yet fully credible.

## Environmental concerns

Several important initiatives have been taken to protect specific marine habitats and non-target species. The new regulations to protect marine mammals (CEC, 2004e), to ban shark-finning (CEC, 2003c), and to protect benthic communities of cold-water coral *Lophelia pertusa* (CEC, 2004f) are examples of the commitment of the Community to integrate environmental concerns into the CFP.

The ultimate objective of the CFP is to develop an ecosystem approach to fisheries management. However, this requires a knowledge base of the marine ecosystem that is still largely missing. The EC believes that, until the scientific community has acquired sufficient knowledge of the ecological factors influencing

fish abundance, it would not be prudent to try to manage fisheries on an ecosystem basis. In particular, purposeful manipulation of the marine ecosystem is unacceptable: for instance, increasing catches of predator species to increase the abundance of their prey has to be delayed until science can provide sufficient data to assess the consequences of such measures with a high degree of certainty.

In the absence of a solid basis, the objective of bringing all exploited stocks to MSY levels by 2015 is considered a realistic proxy to an ecosystem approach because stability in the abundance of these species should largely guarantee ecosystem stability, assuming that specific unwanted anthropogenic side effects can be controlled by technical measures.

Important initiatives have been taken by environmental NGOs, and some of these are well founded and have been incorporated into EC proposals, such as the ban on bottom trawling in areas deeper than 1000 m in the Mediterranean. However, other proposals favour the adoption of a specific instrument without a clear definition of the objective and, therefore, have been rejected. This applies, for instance, to the proposal to ban all bottom trawling beyond the 200 nautical mile EEZ and to use Marine Protected Areas as the main instrument for fisheries management.

Environmental objectives are still largely opposed by fishers, who tend to see themselves as victims of the degradation of the marine ecosystem (pollution, global warming) rather than as culprits. Acceptance of the environmental dimension of fisheries effects will require improved understanding of indirect negative effects on fisheries caused by other human activities, so that environmental considerations in management can be considered a "two-way" problem.

## Other elements

### *Deep-sea stocks*

The management of deep-sea stocks has rapidly become a high-profile conservation issue. Given the extreme sensitivity of such stocks and the severe shortage of scientific information, the only option is to take a precautionary approach. However, gaining acceptance for the measures that are regarded as necessary is meeting great opposition from fishers and national administrations, notably because these fisheries were developed in recent years as an alternative to the declining traditional fisheries of many member states.

The main lesson here is that, although there is a consensus that fisheries should not continue unless there is a sufficient knowledge base to ensure sustainability, the fishers involved become locked up: they should not fish until information becomes available, but without fishing hardly any new information is collected. The deadlock must be broken, and any attempt to restrict deep-sea fishing drastically must be accompanied by a clear effort to improve the knowledge base.

### *Reducing discards*

Thus far, the CEC has favoured an approach to reducing discards based on pilot projects, with full participation of the industry, to investigate different types of solutions adapted to different fisheries. The pilot projects aim to stimulate changes in fishing tactics by encouraging and monitoring innovative practices designed to reduce discarding. For example, financial incentives may be offered for fishing trips, with scientific observers on board, during which fishers would be at liberty to engage in any fishing activity that they believe would significantly reduce discards while maintaining an economically viable catch, even if such fishing activity did not conform to current legislation. However, only one project that has the reduction of discards as an important objective (an effort management regime in Kattegat) appears to be taking shape. The slow progress may result from the absence of clear incentives and from the difficulties in finding a solution for non-discarded, non-marketable fish upon landing.

### *Alternative management strategies*

The Kattegat pilot project referred to above is not limited to the goal of reducing discards, although that is one of its main objectives. The project represents the first attempt at the Community level to replace TAC management entirely with effort management and, therefore, to dispose of the relative-stability concept and replace catch quota by stock with a fixed number of fishing days per month. The system is being developed by the North Sea RAC in cooperation with the CEC. Already at this stage, some difficulties have been identified:

- tuning an effort-only system to ensure a low fishing mortality for Kattegat cod (in line with the cod recovery plan), while allowing for greater effort on other demersal stocks;
- calculating effort levels that would correspond to current and target fishing mortality objectives;
- dealing with fleets that only marginally exploit the Kattegat.

Resolving these problems represents a major challenge for the scientific community. However, this pilot is possible because the area is small with only a few member states involved and because no major controversies exist among different fleets. If such a project were launched over a wider area, the issue of preserving relative stability might make it non-feasible.

### *Management of eels*

The clear scientific evidence for recruitment failure and stock collapse contrasts with a poor knowledge base of existing fisheries in terms of distribution, catches, and effort levels. Although urgent conservation action is obviously required, a basic difficulty is to provide guidance on appropriate and realistic objectives for a species that is outside of our observation during a large part of its life cycle, and to identify measures that meet such objectives and can be applied throughout the area of the distribution of the stock (i.e. across Europe and North Africa) on a fair and effective basis. Moreover, management has to address two completely different issues. The high mortality of eels is attributable to excessive fishing, which can be handled as a fisheries management question within the CFP. However, the overall productivity of the eel stock has been affected by the degradation of its freshwater habitat, which poses completely different management questions, involving different policies, administrations, and legal instruments.

### *Management of resources in the Mediterranean Sea*

With the proposal for the Mediterranean currently being discussed in the Council, it is important to emphasize the failure of the consultation process with industry. The long tradition of local management by fisher associations has played a more important role in everyday affairs than Community legislation, making the present dialogue extremely difficult. In contrast, the long-term absence of standardized, client-orientated scientific advice, another traditional Mediterranean feature, is now being gradually

resolved through the work of the Scientific Advisory Committee, the scientific body of the General Fisheries Commission of the Mediterranean.

## Scientific challenges

As stated above, the implementation of CFP reform is a gradual process. However, some instruments can only be implemented effectively when the appropriate scientific basis becomes available, including the following.

- The knowledge base required to permit an ecosystem-based approach must be further developed, and environmental issues must be integrated in the scientific advice.
- Mixed fishery considerations are essential to the development of fishery-orientated approaches to management, but more sophisticated methods to deal with this issue are required.
- The MSY approach will require the development, for all Community stocks, of long-term objectives for fishing mortality that will provide high, stable yields in the long term, above and beyond the existing biological reference points developed so far.
- Long-term plans require evaluation of the expected social and economic effects of different biological scenarios. Although fisheries science has successfully developed models that allow the biological effects of management procedures to be developed, integration with socio-economic scenarios is lagging behind. The challenge for economists is to collect the necessary data and to develop models to evaluate various long-term scenarios.
- Breaking the current deadlock for deep-sea stocks (no fishing, no new information) must be given high priority.
- Given the low reproductive rate of most elasmobranchs, their overexploitation will be difficult and slow to reverse. They have to be brought under a management regime as soon as possible, and developing an adequate scientific basis is a priority.

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