

# SAFMAMS

## Work Package 3 Deliverable 7

### Best Practices for Provision of Scientific Advice at the Shared Seas Level

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## Introduction - The SAFMAMS project

The SAFMAMS project is aimed at drawing insights from existing research projects and from management itself on the most useful forms of scientific advice for marine environmental management. It intends to communicate those insights to scientists and decision makers, outlining the various forms that such advice can take and suggesting how that advice can best be prepared and presented.

The project is focused on the Common Fisheries Policy (CFP); perhaps the most science-dependent policy framework in the European Union. The objective of the CFP is the sustainable exploitation and equitable distribution of a resource which is constantly changing in complex ways, both in response to human exploitation and in response to natural factors. The Commission's fishery managers (DG Fisheries and civil servants in the Member States) need accurate and up-to-date advice on the fisheries to manage them effectively.

The fisheries of the European Union are going through a period of change. There has been a move towards the greater involvement of stakeholders in providing advice on fisheries management. There has also been a move towards management on a more regional scale. It is important to ensure that the process of reform results in a more effective system of fisheries management, leading to more sustainable fisheries. One aspect of this process of reform is to improve the relationship between fishers, fishery managers and those providing expert advice on the fisheries.

Geographical scale has been the central principle for the SAFMAMS work plan. Scale has profound implications that range from the ways that the marine environment is observed to the effectiveness of different management techniques. All management is finally implemented at the local level. Yet the scientific knowledge that underpins management must come from observations made at different spatial scales. And the management decisions themselves must relate to the largest scale on which the relevant natural system functions. For these reasons SAFMAMS has examined the generation and use of expert advice in fisheries management at three geographical scales, viz:

- the European level;
- the shared, regional seas level, and
- the local or sub-national level.

This particular paper considers best practices for the provision of scientific advice on fisheries **at the shared seas level**; that is, at the level of the regional seas around which the Common Fisheries Policy is now based.

As part of the reforms to the CFP new institutions have been established to promote stakeholder involvement in fisheries management on a regional or shared seas scale. Regional Advisory Councils (RACs) have recently been formed for a number of seas and fisheries and bring a wide range of interest groups together to provide management advice on fisheries.

The process of considering best practices at the regional scale for this paper began with the preparation of a desk-based review of science and stakeholder involvement in the production of advice on fisheries management (Deliverable 2). Three sets of stakeholders were asked for their reactions to that review and were then asked to consider the most helpful ways of compiling advice at the shared seas level, through the new RACs. Subsequently, a series of best practices have been compiled, based on the review and on the comments of stakeholders. Those best practices are presented in this paper.

## **Review of Science and Stakeholder Involvement in the Production of Advice on Fisheries Management**

The shared seas component of the SAFMAMS project began with a review (Hawkins, 2007) which examined the involvement of both stakeholders and scientists in the process of fisheries management.

The review emphasised that fisheries management is an important task. There is an inexorable trend towards over-exploitation of fishery resources as a result of improvements in fishing technology. Sanctions are necessary to guard against excessive exploitation of fish stocks and social and legal arrangements have developed to provide the necessary control over fisheries. Strong regulation of fisheries is now commonplace throughout the world.

The modern era has seen the development of new systems of fisheries management based on the application of science. It is evident that expert advice, especially in the field of biology, is needed for the successful management of fisheries. However, there is increasing recognition that the development of successful and sustainable fisheries is not simply a biological or ecological problem. As the Brundtland Report of 1987 points out, it is only by combining ecological, economic and social factors within an appropriate political or institutional structure that development can take place without exhausting natural resources. The successful management of fisheries requires the participation of fishers and fishing communities as well as scientists and civil servants.

Diverse systems of ownership of fisheries are in place under different political systems. Some fisheries are privately owned, others are managed by local communities, but most are regulated by the state or by supra-national powers. Even when fisheries management is delegated to fishers or fishing communities, there are often several layers of management, with governments or international commissions playing a superior role. The development of fisheries policy and the day to day management of fisheries is generally carried out by fishery managers, employed as civil servants, aided by expert advisers. In many instances, management is top-down or hierarchical, with fishers playing only a minor role.

Fishery managers find it hard to deal with the complexities of fisheries and cannot always anticipate the effects of the measures they impose. They experience problems in regulating activities taking place at sea, especially when enforcement is under the jurisdiction of several different states. Fish stocks themselves fluctuate and behave unpredictably.

Scientific advice on fisheries management focuses on estimating the quantities of fish that can be caught without reducing stocks to a point where they can no longer sustain themselves. Mathematical models of the fisheries determine safe limits for harvesting the fish stocks, and explore how close actual exploitation is to the limits which have been set. These analytical models have limitations. They are not easily understood or interpreted. They deal in the main with single stocks and do not take account of the complex relationships between different species within a changing environment. They are data hungry, but often cannot be provided with the quality and quantity of data that they need. They require further extension and development which must be accompanied by significant improvements in information from the fisheries, much of which can only come from fishers themselves.

Fisheries management is not only about conserving fish stocks. The objectives of management include achieving fairness in allocation of fishing opportunities; defining legitimate fishing methods, specifying appropriate fishing locations and seasons; promoting sound economic operation of fishing enterprises; avoiding conflict between fishers; ensuring

stability of fish supplies; reducing the impact of fishing upon the environment; and enforcing fishing regulations. A wide range of advice is required, not just advice from biological scientists. Again, much of the advice required can only be obtained through engagement with fishers.

There are problems in applying scientific expertise to practical and political problems. Close examination of failed systems of management have pointed to the difficulties which arise when scientific advice is provided by organisations which are embedded too deeply within the management structure. Indeed, there are major issues over the way expert advice is obtained and presented. Scientists, like everyone else, work within a culture which may steer their work in particular directions. Scientists tend to show allegiance to particular paradigms. They need to be exposed to alternative views. Much of the scientific advice on fisheries management comes from institutions which are owned and funded by government fisheries managers and which have a narrow perspective. There may be pressure to maintain a particular position or to produce advice which supports a political agenda. There may be temptation for politicians and administrators to claim falsely that there is scientific support for their actions. Moreover, control may be exerted by political authorities on the release of data and the open expression of views.

Inquiries into the political application of scientific advice (including the UK Inquiry into BSE, and Canadian inquiries into the collapse of the northern cod fisheries) have shown that safeguards are necessary to ensure that scientific advice is objective and fit for purpose. The need for advice must be anticipated; expert advice must be drawn from a variety of diverse sources and not from a select group of specialists; specific measures must be taken to ensure the quality, integrity, and objectivity of advice; uncertainty and risk must be assessed, communicated and managed; there must be openness and transparency; and the impact and validity of the advice must subsequently be reviewed. There is a strong case for making scientists accountable to sceptical inquirers, including members of the public, who are free to question the foundation of the claims made.

There are practical advantages to be gained from more participative governance; from a system of fisheries regulation and management where the state plays a less intrusive role and elements of decision-taking are devolved to stakeholders and other interests. The need for dialogue with interested parties is especially critical in dealing with risk to the environment and natural resources, where uncertainty is the norm. New ways of acquiring expert advice are required which draw upon knowledge from a wide range of sources.

In relation to fishing, the key candidates for participation include those dependent upon fishing for a living; those whose lives may be affected by regulation of the fishery; those with political and environmental concerns about fishing; and those whose own activities may impact upon the fishery. On purely pragmatic grounds it is important to engage all those stakeholders who are essential to the successful regulation of the fishery. However, concern for social justice has also to be met.

Under the Common Fisheries Policy (CFP) a system of management has evolved which brings together member states whose interests are very different and whose expectations from the policy differ. The CFP is managed directly by the European Commission, a body of un-elected civil servants, although decisions are ultimately ratified by a Council of Ministers from Member States. The European Parliament does not exert significant control. Extraordinarily, the CFP is one of only five areas of exclusive competence for the Commission within a new draft treaty for the European Union.

Expert advice to aid management within the CFP comes mainly from biological scientists employed by governments. Scientists gather the data required, country by country, and then bring it together for analysis and the preparation of advice through a body established by

international convention – the International Council for the Exploration of the Sea (ICES). Stock assessment, the process of estimating the condition of the fish stocks, and the subsequent presentation of advice on management, is treated as the exclusive preserve of scientists within ICES.

The European Commission has acknowledged in a Green Paper (ECF, 2001) that there are major problems with the Common Fisheries Policy (CFP). Politically, stakeholders do not feel sufficiently involved in management and many believe that there is no level-playing field in terms of compliance and enforcement. The Green Paper concluded that the Commission must change the way that advice on the fish stocks and management of the fisheries is provided. There must be wider participation in the process.

As part of the reforms to the CFP a new institution has been established to promote stakeholder involvement in fisheries management – the Regional Advisory Council (RAC). RACs have been proposed for a number of regional seas and bring a wide range of interest groups together to provide advice on the management of fisheries. The first formal meeting of the North Sea Regional Advisory Council (NSRAC) took place in November 2004. Since then, additional RACs have been established for Pelagic Fisheries; North Western Waters; the Baltic Sea; and South Western Waters.

One of the important functions of the new RACs is to provide sound, evidence-based advice on the management of fisheries. Integrating the views of scientists and stakeholders within the RACs is critical to their functioning. However, they are new bodies, requiring novel ways of operating. This review considered how best the advice from scientists and stakeholders could be integrated by the RACs and by fishery managers. Previous experience with partnerships between stakeholders and scientists (most notably the North Sea Commission Fisheries Partnership) had shown clear benefits from scientists and stakeholders working together. Informal consultation meetings between the partnership and a scientific working group had resulted in improvements in the knowledge of scientists and in the data available for analysis. The interactions also provided the transparency and opportunities to comment desired by stakeholders.

Much experience in integrating the advice from scientists and stakeholders has already been gained in the United States of America and Canada, where participation of stakeholders in fisheries management has existed for much longer.

In the USA a number of initiatives have been taken to bring scientists and stakeholders together to improve the quality of stock assessments and gather wider relevant information to address fishery management issues. One of them, South East Data Assessment and Review (SEDAR) especially seeks constituent and stakeholder participation in development of the fish stock assessments, transparency in the assessment process, and rigorous and independent scientific review of completed stock assessments. It operates through three stages. First; a data workshop where data-sets are compiled, documented, analyzed and reviewed; second, an assessment workshop where quantitative population analyses are developed and refined; and finally a review workshop where a panel of independent experts scrutinises the data and assessments and then makes appropriate recommendations. SEDAR provides a very successful model for integrating science and stakeholder inputs into fisheries management.

In Canada, the collapse of ground-fish fisheries in the early 1990s prompted major changes to the system for managing fisheries. A new Regional Advisory Process (RAP) has developed in which stakeholders participate. The essential purpose of RAP is to provide peer reviewed information on the status of the fisheries and fish resources, involving industry, other stakeholders, and outside scientific experts in the review. The process is subject to very prescriptive guidelines but in practice is very diverse, depending on the

region and the issue to be discussed. The three main elements are issue identification, assessment of the issue (the main RAP review), and the production of a status report for the Minister. As with the American system, scientists, stakeholders and managers discuss positions before data assembly is complete and analysis begins. Stakeholders are present and can participate in the formulation of advice. The process is subject to strict national guidelines which place emphasis on the full exchange of data, transparency and peer review.

Both these systems contrast with the hierarchical system of management imposed under the CFP. The RACs can be seen as the beginning of a long overdue move to involve stakeholders to a much greater extent in management. There is an opportunity to put in place a more transparent system of fisheries management for the European seas, where the expertise and role of stakeholders is fully recognised and accepted.

The review concluded that one of the stumbling blocks in the way of further engagement between scientists and stakeholders within the CFP was the dominant role played by ICES, the scientific body established more than 100 years ago to coordinate national scientific efforts in the north Atlantic and now contracted by the European Commission to provide scientific advice on some (but not all) of the fisheries managed within the CFP. Within the European Union, fisheries managers still depend upon ICES as a single external source of scientific advice on certain fisheries, with its own conservative and exclusive way of operating. The review concluded that the current system for obtaining expert advice under the CFP would have to change if further improvements in fisheries management were to be achieved.

## **Presentations to the RAC Workshops**

Workshops were held with representatives of three of the RACs, viz:

The Pelagic RAC  
The North Sea RAC, and  
The Baltic RAC

A common presentation was prepared and made to each of the Workshops, based on the findings of the review.

The main points made in the presentation were:

*SAFMAMS aims to draw insights on the most useful forms of scientific advice for marine environmental management. Part of the project is focusing on identifying the most useful forms of advice for the RACs*

*At the workshop we would:*

- *Report preliminary SAFMAMS findings on advice to RACs*
- *Discuss what a 'perfect advice system' might look like from the perspective of the RACs*
- *Consider wider changes that would give the RACs greater confidence in the scientific advice on fisheries*

*The RACS now gave fishermen and other stakeholders a direct opportunity to play a part in fisheries management. Preliminary discussions within the RACs had revealed that the RACs required:*

- Regular dialogue with scientists, economists and other technical experts at their meetings & working groups*
- Assistance with questions on the fish stock assessments – including assurances that the assessments take account of all the available information*
- Reality checking on proposals coming from the RAC or being considered by the RAC*
- Expert advice on the social, economic & environmental consequences of management proposals*

*There were special concerns coming from the RACs over the fish stock assessments. There was concern that there was often a lack of basic data on:*

*landings and discards  
the spatial distribution of the fishery  
the species being targeted in the fishery  
the impact of management measures*

*Moreover, the assessments dealt only with single stocks. Data on which the assessments were based was often out of date. The ecosystem approach was not fully integrated into the stock assessments. There was a lack of peer review by independent scientists.*

*There had been problems in arranging for scientists and other experts to assist the RACs with advice. Scientists were already heavily committed to work for Member States, ICES and STECF. Scientists' time had to be paid for. One or two member States had supplied scientists for RAC meetings, but perhaps to suit their own interests. Greater participation by scientists in the work of the RACs was needed to promote wider dialogue and ensure that advice was evidence-based.*

*The European Commission wanted the RACs to gain their scientific advice only from ICES. ICES itself:*

- Accepted that participation of stakeholders was desirable and was part of the wider ecosystem approach*
- Emphasised that stakeholder participation must not be at the expense of the quality and independence of the scientific advice*
- Was willing to present the results of its assessments to the RACs*
- Would like the RACs to help it to improve the quality of data*
- Welcomed the RACs to take part in its Annual Science Conference*

*The Commission had:*

- Taken steps to enable RACs to forward requests to ICES via the Commission*
- Revised its Memorandum of Understanding with ICES*
- Arranged for RACs to refer proposals to ICES for comment under the MOU (via the Commission)*
- Reviewed its Data Collection Regulation and invited the RACs to comment on the data required, for example fishers' information*
- Agreed that if RAC questions could not be answered by ICES scientists then it was willing to discuss new research needs*

*The current system was overloading the scientists carrying out the assessments & providing advice. It was necessary to 'book' scientists in advance. STECF, ICES & the RACs were all sharing the same scientists and the fact that they were the same, and that they represented their particular countries within ICES and STECF, raised questions over whether they were really independent. However, RACs did not have resources to pay for independent scientists to attend their meetings*

*There had been many examples of society failing to take appropriate action because of flaws in the way scientific advice had been sought and applied. Inquiries into science had recommended that:*

- *Advice must be obtained from a wide range of sources,*
- *Independent review of the science was important*
- *Scientists could become too embedded in the management/political structure*
- *Data must be freely exchanged and open to all*
- *Uncertainties and risks must be identified and made known to the public*
- *The knowledge of scientists and managers might be limited & information must also be sought from stakeholders*
- *Advice given & decisions taken must be reviewed later*

*There were two direct issues for the RACs to address:*

- *How should expert advice for the RACs be obtained?*
- *How could the fish stock assessment process be improved?*

A general discussion followed the presentation. That discussion was then widened to include other issues, including the successes and failures of the RACs.

## **The Three Workshops**

### **Pelagic RAC**

The Pelagic RAC Working Group on Long Term Management Plans met in Edinburgh Scotland on the 6<sup>th</sup> & 7<sup>th</sup> February 2007. It included members of the Pelagic RAC, scientific advisers, an observer from the European Commission and participants from the SAFMAMS project. Initial sessions covered the development of long-term management plans for horse mackerel. Subsequently the working group turned its attention to the scientific requirements of RACs.

A presentation was given on the SAFMAMS project. Participants were then asked to write down two or three things that had struck them during the presentation. The topics commented upon are summarised in Table 1.

The most frequently made comment, which came from fishing industry representatives, concerned the need for RACs to have independent scientific advice. It was said that science was important in guiding decision making and science was the "currency" of fisheries management.

Participants confirmed the difficulties of obtaining independent scientific advice for the RACs because of cost constraints. Credibility of the advice and ability to challenge the scientific establishment view were considered important. Some believed that the Pelagic RAC had not received the scientific support it needed. Scientists present commented on the practical

and peer-review problems associated with a limited pool of scientists. One industry representative thought that independent advice for the RAC was an unrealistic goal. Another advocated a more pragmatic approach of getting on with management decisions using whatever science is already available.

Despite the wish by many participants from the RAC to have access to scientific advice, some expressed scepticism of overly institutionalised science, questioning its objectivity, flexibility and importance for the work of the RAC. Some industry representatives felt that the RAC should not be trying to emulate the work and language of scientists. The current dependence on science was part of the problem and more communication with scientists would not necessarily improve things. The uncertainty surrounding fisheries science was seen as a particular problem by two industry representatives who wanted scientists to contribute useful facts “not more uncertainty”.

In reply, scientists pointed out that there is good and bad science. They accepted that the system lacked genuine peer review although they believed that scientists did try to be objective. They thought that the relationship between RACs and scientists needed to be clarified or formalised.

Expert advice from areas other than natural science was required, including socioeconomics, engineering and social science. There was a need to examine the management system itself.

Following the discussion on the presentation each participant was asked to write answers to two further questions:

1. What specific advice product should the RAC be providing to the Commission
2. What expertise is needed to create that product?

The topics commented upon are summarised in Table 2.

There was widespread agreement from the fishing industry that the RACs really existed to allow fishers to put across their points of view and that the main expertise required was that possessed by fishers themselves. There was a cautionary remark that fishers are not always able to communicate their ideas well. Scientific advice to the RAC, and assistance in communicating and translating fishers' views into terms which would be understood by others was important. Advice from economists and social scientists was seen as especially critical but so far had been lacking.

## **North Sea RAC**

The North Sea RAC was the first to be established (in November 2004). A Sub-Group of the North Sea RAC Demersal Working Group met on March 20<sup>th</sup> 2007 in Brussels Belgium specifically to discuss scientific issues and relations with ICES. Participants included fishers, scientists, representatives of environmental interests and SAFMAMS partners.

RAC members were reminded of a discussion on stock assessments held at the October 2006 meeting of the Demersal Working Group. After a presentation on the results of the assessments the chair of the Working Group had stressed that every year the NSRAC had commented on the ACFM advice, and every year it had identified flaws and had called for improvements. It was no longer satisfactory to have to draw attention to problems in the assessments from one year to the next – without any action to improve matters. The Sub-

Group had been asked to look at new ways for allowing stakeholders from the RACs to play a part in the stock assessment process.

Following a presentation on SAFMAMS, participants were asked what had gone well with the NSRAC and why.

It was suggested that the RAC had fostered a greater degree of trust between all parties. It had received very strong support from some stakeholders. Some Member States had been active supporters and seemed to see the RAC as a vehicle for reform. The RAC Working Groups, the new RAC Development Groups preparing long term plans for the major fisheries, and the RAC's Focus Groups had all contributed to improvements in the formulation of management advice. The RACs had been successful because they brought together a mix of scientists, fishers and fishery managers. The interdisciplinary nature of RAC meetings made them especially productive.

Interactions between the RAC and STECF subgroups had been useful, although it was still not clear how arrangements for the RACs to take part in this Commission body could be formalised.

An economic study by the RAC, which considered the data required for evaluation of the impact of management measures, had been important in enabling proper socio-economic evaluation to be carried out. The RAC had initiated the study and a wide range of members had participated. Discussion had gone well, had confirmed that the economic link was missing from the current system of management, and had shown the importance of having social and economic advice.

In looking at the operation of the NSRAC it had become apparent that proposals were more successful in achieving consensus within the RAC if they were backed up with data. It had also become apparent that it was counterproductive for an organisation to attend the RAC with an inflexible position, or constrained by decisions taken elsewhere.

Cooperation with scientists had been important for the work of the RAC. As a result of the Edinburgh Workshop on Long Term Management Plans, organised by the RAC, there was now a positive feeling towards long term management and the NSRAC, with the help of scientists, had developed new ideas for moving gradually in the direction of sustainable fisheries without setting fixed and unrealistic targets. Another workshop had defined the scope of work for mapping North Sea fisheries and had engaged with the issues of marine spatial planning. The RAC had given discussions on this subject a formal shape. This had subsequently borne fruit when the subject of wind-farms had been discussed. Funding had been an important factor in making progress and here one of the Member States had helped. The results of these meetings had been less important than establishing rules of engagement between scientists and fishers. However, cooperation with scientists had been constrained by lack of funding.

One of the scientists present remarked that for him the greatest influence had come from the North Sea Commission Fisheries Partnership, which had preceded the NSRAC. It had provided a forum for fishers and scientists to meet to discuss fish stock dynamics. He had been challenged as chair of an ICES assessment WG to explain the output of mathematical models to stakeholders and that had clarified his own ideas. The partnership had fostered much more open communication between scientists and fishers. Scientists had talked freely about the significance of the science and the issue of how information from different sources could be combined. Fishers had been able to challenge preconceived ideas. With the setting up of the RACs some of that ground gained had been lost. More interaction between scientists and fishers was needed before the ICES assessment working groups met. There was a question over why ICES did not promote such openness itself.

A representative from an Environmental NGO thought that the cod recovery symposium organised by the RACs had been a particular success. There had been a strong input from scientists, and many opinions had been expressed, but it had still been possible to draw general conclusions. It had also been possible to pinpoint areas of disagreement. The symposium had been a major step forward in terms of convergence of thinking. What had made the conference work? There had been a variety of viewpoints presented. Scientists had not all been in agreement and it had been possible for dissent to be expressed and for individuals to stand their ground. Stakeholders had felt their views were being listened to.

Table 3 summarises the views expressed.

## Reforms to ICES

Discussion at the North Sea RAC science sub-group had continued on the reform of ICES. Proposals for change from within ICES itself were described. This reform had been prompted by a wish to improve the timeliness of quality assured advice for ecosystem-based management of marine resources. There were a number of drivers for change including:

- Requests for advice no longer fitted the ICES' annual cycle
- There were more requests for "ecosystem-based" advice
- There was a call for strategic advice on marine research
- Documented quality assurance was required
- Better communication with clients was required

The current system for providing advice is shown in Figure 1 below. Expert Groups (the current Stock Assessment Working Groups) prepare the advice, which is subsequently reviewed by Review Groups, and then prepared in its final format by the Advisory Committee on Fisheries Management (ACFM, for advice on the fisheries). Two other Advisory Committees exist in parallel with ACFM, the Advisory Committee on Ecosystems (ACE) and the Advisory Committee on the Marine Environment (ACME). A Management Committee on the Advisory Process (MCAP) oversees the preparation of advice.

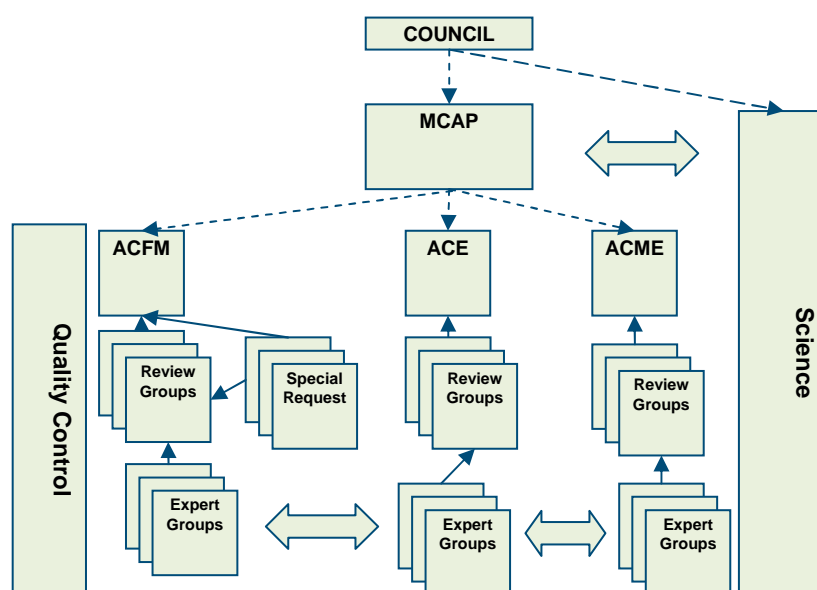


Figure 1: Current ICES Advisory Structure

In the reformed system (Figure 2 below), the Expert Groups would become the focus of the advisory process. They would transform knowledge into advice. Essentially, the responsibility for preparation of the advice would fall to the level of the experts themselves. More funding would be devoted to the Expert Groups and the role of the Advisory Committees –ACFM, ACE and ACME – would be compressed into a single Advisory Group. The advice from the Expert Groups would be inspected by a Review Group, as before, but the Review Groups would not interfere with the advice but simply send it back for revision or strengthening if necessary. The new Advisory Group would also not tinker with the advice, but would accept the advice or pass it back to the Expert Group for re-examination.

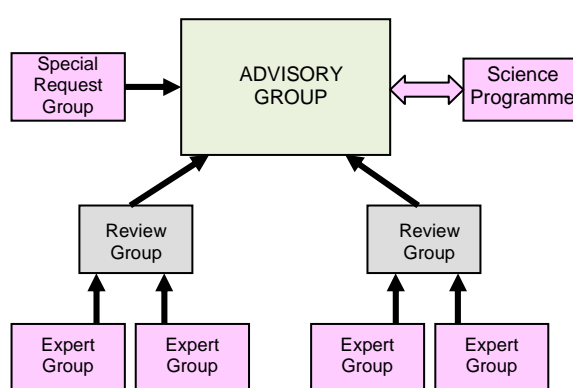


Figure 2: New ICES Advisory Structure

Under the new system it was intended that a wider range of data would go to each Expert Group. The traditional data would be forwarded to the Expert Group by the National Institutes but in addition oceanographic and environmental data would be considered. The Expert Groups would be regionally based and would interface with the appropriate RACs.

The role of stakeholders in the new system was up for discussion. There might be a clearer role for stakeholders in the preparation and evaluation of data, and greater scope for a greater input into the Expert Groups from those with direct knowledge of the fisheries. Such a system should be more responsive to requests coming in – for example from the RACs – and should open up the advisory process to a wider range of data and new forms of knowledge.

Participants in the NSRAC science sub-group wanted the RACs to be involved more closely in the advisory process, and especially in the preliminary process of data collection and evaluation which was an essential part of the process. In addition, the RACs should have observer status within the Expert Groups themselves and in the subsequent Review Groups and within any sub-groups which might be set up to assist and extend the advisory process. Greater integration of RACs in the process would bring stakeholders and scientists together and revive the close degree of discussion between fishers and scientists that formerly characterised the North Sea Commission Fisheries Partnership.

## The Baltic RAC

A Workshop with the Demersal Working Group of the Baltic RAC took place in Gdynia Poland on the 8th May 2007. Participants included fishers, scientists, representatives of environmental interests and SAFMAMS partners. Following a presentation on the SAFMAMS project participants discussed how the system for providing advice within the Common Fisheries Policy could be improved.

There was concern that the RACs should not become too heavily involved with science. The RACs were for stakeholders, and existed to express stakeholders' views, not to present scientific advice. However, advice from the RACs had to be based on evidence, and that inevitably involved engagement with scientists. There was also a need to translate fishers' views into language that would be understood by the Commission, and scientists could help to provide that. There was support for the idea of obtaining independent science but it was recognised that funding would be required. The problem was not just the availability of scientists to give advice. There was also a lack of data, which exacerbated many of the problems being encountered.

ICES had become too powerful as the only source of advice. It needed to be challenged. There was also a need for advice on wider subjects like the economics of the fisheries. At the moment the Commission was not always willing to listen to stakeholders.

A structure was now in place for the RACs which participants accepted and could live with. The two thirds/one third arrangement, with the fishing industry representatives in a majority, had initially been of concern to environmental NGOs but they were able to operate within that constraint - provided a consensus view was the target. Others agreed that reaching a consensus was an important aspect. Much depended on the degree of trust between participants, however, and a proper dialogue was now taking place within the Baltic RAC.

There was concern amongst participants that the setting up of the RACs had resulted in their having too many meetings to attend. There should be changes to remove other less useful organisations. The RACs were now firmly part of the CFP, and they provided the main focus for fishers and other representatives from around the Baltic to discuss fisheries management issues.

A number of participants emphasised the need for a regional approach to the CFP. The next step might be to establish a Regional Council of Ministers to consider Baltic issues. Currently, blocking motions were possible within the European Council, with people outside the Baltic able to influence decisions that were essentially regional. Regional groupings and coordination within the Council were important for the future.

Table 4 summarises the views expressed.

Discussion moved on to the key objectives for fisheries science in the Baltic. The first and main objective was to get the stock size assessments right, together with the associated objectives of obtaining objective estimates of actual catches and landings.

A further objective was to increase fishers' engagement in the science. There was currently a lack of trust in the assessments. Increased cooperation in providing data and greater transparency in the assessments would help. Greater involvement of fishers generally was thought to be valuable, including participation in scientific observer programmes.

Others thought it was important to achieve better economic evaluation of the fisheries sector. How was the CFP affecting fisheries in the Baltic? What was the economic position of the sector? How did management measures in the Baltic affect the social structure?

A number of science objectives had already been agreed at the Copenhagen Conference, including:

- Improved dialogue between scientists and the fishing industry and the incorporation of more information from the fishery
- More research on the relationship between fishing capacity, fishing effort and fishing mortality to identify how they might contribute to illegal and unreported fishing
- Bio-economic and social analysis and modelling associated with illegal and unreported fishing
- The review and adjustment of reference points for cod stocks in the Baltic
- Development of techniques to assess the success of management, including technical conservation measures

Table 5 presents comments on key objectives for fisheries science in the Baltic

Participants were then asked what had worked well in terms of fisheries science, and what had worked badly. One positive example was the way scientists and fishers had worked together in evaluating the efficacy of a new generation of more selective fishing nets. In terms of the stock assessments, fishers thought the herring assessments were about right, but the assessments of salmon had been purely political. The RAC was at the very beginning of a period of greater cooperation. It was evident that some things were still wrong, but the dialogue to put things right had only just begun.

It was emphasised that scientists must understand that fishers are an important source of knowledge. Equally, fishers had to accept that scientists were working in good faith. Building a partnership between scientists and fishers was essential. The improved understanding that had been achieved by the RAC created hope for the future. However, there was a paradox. Information from fishers was vital if the science was to be improved. However, with a dysfunctional management system there were dangers to fishers in assisting with the science. It would be useful to create an amnesty for fishers and to do a retrospective analysis using real landings instead of recorded landings.

## **Conclusions from the Workshops**

### **General Comments**

Starting each workshop with a presentation may have influenced the views which were expressed in the subsequent discussion. However, the presentation had been useful in advancing each group to a common understanding of the context for RAC advice. The presentation also allowed the discussion to address the questions of interest within a short time and had stimulated discussion. The facilitation method of asking each participant to write down and contribute responses to the presentation was very successful at focusing responses on the question of interest and collecting a rich selection of views from all participants.

## A Regional Basis for for Fisheries Management

It was evident from the workshops that fisheries management was regarded as a difficult task. However, there was general agreement that the task might be simplified by devolving management to the lowest geographical level; to the level that encompassed all the relevant factors and involved all those who need to be involved. For fisheries, the most appropriate level would often be that of the regional sea. Such seas could readily be defined spatially, and within them there might well be a common oceanographic regime. They might have particular fisheries adapted to regional conditions and those fisheries might capture distinctive local species. Difficulties might be encountered in proscribing their precise boundaries, and there might be areas of overlap with adjacent seas, but there was no doubt that fisheries within regional seas like the Baltic Sea, the North Sea, and the Mediterranean Sea had common features, and were more susceptible to management through their own regimes than through a common policy framework. Indeed, some of those regional seas might even be sensibly broken down into even smaller units for management purposes. With fisheries management, one size did not fit all.

When the European Economic Community was first formed, an important provision of the Treaty of Rome, under Article 40, was that the organisation established '*shall exclude any discrimination between producers or consumers within the Community*'. This was later interpreted by the six founder members as providing open access to fisheries within Community waters by all Member States. Common rules for fisheries, adopted at Community level, were intended to be implemented in all Member States. Progressively, those common rules have been weakened. First, a derogation was introduced which provided for only limited access by Member States to the coastal waters of other Member States. Then, a TAC and quota system was adopted which shared catches out between Member States in accordance with past track records of their fishing fleets, through what has become known as the '*Principle of Relative Stability*'. When Regulation 170/83 for the conservation of fishery resources in Community waters was introduced the Baltic Sea and the Mediterranean Sea were excluded from its provisions. In effect, there was *de facto* recognition that fisheries management required local solutions. The accession of Spain and Portugal to the European Community in 1986 provided a major challenge to the CFP as both countries wished to gain access to the waters of the whole Community and wished to exercise what they saw as their right of access to a common resource. Their ambitions were not realised. The issue of regional management has since become especially contentious for them, as a regional approach is seen as excluding them from areas in which they wish to have an interest.

Scientific advice on fisheries within the European Union has for many years been organised on a regional basis. Advice on fisheries in northern Europe has been provided by the International Council for Exploration of the Sea (ICES). Advice on the Mediterranean fisheries has come from a variety of sources and is now the responsibility of the Scientific Advisory Council of the General Fisheries Commission for the Mediterranean (GFCM), an inter-governmental organisation set up under the auspices of the United Nations Food and Agriculture Organisation (FAO). The European Commission also consults its own Scientific, Technical and Economic Committee for Fisheries (STECF) on the state of the fisheries and on management measures. STECF is largely made up of national experts from the Member States' own institutes.

With the establishment of the Regional Advisory Councils there had been tacit recognition by the European Commission that management advice was best focused at the regional seas level. The Green Paper on reform of the CFP (Commission, 2001) set out the principle of establishing a network of regional advisory committees on fisheries to involve stakeholders in discussions about fisheries management while at the same time ensuring that fisheries governance remained compatible with the legal and institutional framework of the Treaty and

that it did not affect the global and Community character of the policy. The regional committees were intended to cover regional management units (such as the North Sea) or specific stocks to be defined (such as migratory species like tuna).

There was little doubt that the proposal to devolve management to a regional level was popular with fishers and other stakeholders. A recurrent theme during the workshops was the great complexity of the CFP and the need for simplification and rationalisation of the management structures.

The devolution of management authority and management advice to a regional level has existed in the United States since 1976, when the Magnuson Fishery Conservation and Management Act established Regional Fishery Management Councils. Canada too has recognised the importance of management on a regional scale and now conducts its fish stock assessments through a new Regional Advisory Process (RAP) which essentially devolves management to a regional level while still maintaining the central role of the Department of Fisheries and Oceans.

It was hoped that the increasingly regional focus of the CFP would result in improvements in the appropriateness of the scientific advice. The proposed reforms to the ICES advice structure were also intended to introduce a stronger regional element. The new ICES Expert Groups would be regionally based and would interface with the appropriate RACs.

There had been general support from fishers for the move towards more regional governance. The workshops revealed dissatisfaction with the current, complex, hierarchical structure of the management system. There was a wish to reduce the number of meetings that stakeholders have to attend, and a wish by some to dispose of central bodies like the Advisory Committee on Fisheries and Aquaculture (ACFA), which were regarded as talking shops, in favour of regional bodies able to resolve regional issues. Indeed, in the Baltic there was support for a Regional Council of Ministers to consider Baltic issues. There was resentment that Ministers from Member States outside the Baltic were able to influence decisions that affected only the Baltic States.

Further developments within the European Union would also promote a regional approach. The European Commission had proposed a new and ambitious strategy to protect more effectively the marine environment across Europe. The Thematic Strategy on the Protection and Conservation of the Marine Environment aimed to achieve good environmental status of the EU's marine waters by 2021 and to protect the resource base upon which marine-related economic and social activities depended. A Marine Strategy Directive would establish European Marine Regions on the basis of geographical and environmental criteria. Each Member State, in close cooperation with the relevant other Member States and third countries within a Marine Region, would be required to develop strategies for its marine waters.

It was evident from the workshops that stakeholders believed that a regional approach to fisheries within the CFP was here to stay, and that the Regional Advisory Councils would play a key role in fisheries management in the future.

### **Involvement of stakeholders**

As the review of science and stakeholder involvement pointed out, severe difficulties arise when governments attempt to manage or regulate fisheries directly, in a top down manner. There were many examples of fisheries failing despite being subject to strong government control. One significant factor was the difficulty experienced by civil servants in understanding the complexity of the fisheries and in anticipating the effect of management

measures. It was simply not possible for individual civil servants to understand all aspects of the fisheries they were attempting to manage. They were also affected, as we all were, by cognitive bias – the tendency we had to seek or interpret evidence favourable to our existing beliefs, and to ignore or reinterpret other evidence. In addition, there were often unintended consequences from the imposition of regulations. Not least, ingenious schemes may be devised to circumvent management measures. Fisheries often involved fishers from a number of states, acting under different jurisdictions and there was scope for differences in their response to the regulations. Furthermore there were undoubtedly difficulties in shore-based regulators adequately enforcing regulations imposed upon activities carried out at sea, in circumstances where fishing could not readily be observed or controlled. Finally, there were inherent difficulties in regulating the exploitation of natural resources which fluctuated and behaved in a way which was often unpredictable. It was not possible to manage the resource itself – only the activities of fishers could be regulated, and that could only be done with difficulty.

Both Hawkins (2005) and Gray (2005) have noted a current loss of faith in the abilities of governments and inter-governmental agencies to manage fisheries and a current unwillingness by fishers to defer to bureaucrats and experts. Hawkins has emphasised the particular distrust by fishers of stock assessments and advice given by scientists. Fishers are aware that in some instances the information available to them may be more up to date and detailed than the information being used by scientists. There is a reason for this. For many years European fisheries have been bedevilled by problems of illegal fishing and unreported catches. Often the quantities of fish caught have been greatly in excess of the reported landings data which are used as the basis for the stock assessments. Moreover, landings have been said to have been caught in one area when in practice they were caught in another. The results of the stock assessments have been greatly undermined by these practices, to an extent which may only be known to fishers.

Science often deals with difficult and controversial subjects, especially in trying to resolve issues of risk to the environment and natural resources. New ways of obtaining expert advice are required in these areas where unpredictability, uncertainty, poor information and poor control over management are the norm. Dialogue between interested parties – stakeholders – becomes important, especially when the economic and social implications are large – where people's livelihoods are at stake. Thus, the increasing pressure to involve stakeholders in decision-taking, has emerged not just because of dissatisfaction with the way scientific advice has failed in some contexts, but also because it has become apparent that there are real advantages to be gained from public dialogue over critical scientific issues.

Experience with the North Sea Commission Fisheries Partnership, which brought scientists and fishers together before the advent of the RACs, showed that there were major advantages to be gained from promoting dialogue between fishers and scientists. During the SAFMAMS workshops with the RACs it became apparent that many scientists welcomed open discussion of the assessments with fishers. Their experience had been that fishers had been able to challenge pre-conceived ideas and that this had been beneficial to both parties.

Some scientists might wish for communication to take place in one direction only. Their aim in taking part in a dialogue with fishers might simply be to gain better information. Yet fishers did not wish to impart information, and in particular to disclose any misdeeds on their part, without gaining something in return. Discussions at a meeting between scientists and fishers during the 2006 ICES conference showed clearly that there was a real fear amongst scientists that allowing fishers to get too close to the assessments created a risk of damaging the science. Equally, fishers feared that any confession on their part that the true catches were much larger than the recorded landings would result in their being penalised.

Are these risks for both sides real? Certainly, given the opportunity, fishers would lobby for their own views to be taken into account, but experience with the partnership had not indicated that fishers took unfair advantage of openness on the part of scientists. If there were problems with the data, or with the models, or if scientists were not fully familiar with the way a fishery operated, it was sensible for them to admit to this and seek the assistance of fishers. Much greater dangers would arise if scientists withheld their uncertainties and errors from fishers. There were also risks to both parties if fishers were not frank with scientists about misreporting or lack of recording of catches. During one of the workshops fishers raised the possibility of an amnesty, where they would confess to illegal and unreported fishing in return for recognition that larger TACs and quotas might be merited. There was scope for a greater exchange of information between both parties, under conditions where trust and understanding prevailed.

Wilson (2007) proposed that participation by stakeholders in science-based policy increased the legitimacy of the advice. It promoted buy-in to the process itself. It also ensured that the experienced-based knowledge of stakeholders was not neglected. Wilson drew attention to the idea of Ravetz (1999) that effective science-based policies in arenas of high stakes and high uncertainty require an open dialogue with all those affected. The term '*extended peer community*' was used to define those people who have the knowledge to contribute to analysis of the problem, who can contribute to reality-checking.

Thus, participation by stakeholders is not just a case of good practice, it is a key ingredient of good governance. Participation resolves conflict, brings forward new information and improves decision quality. Participation is also a particular feature of adaptive management (Holling, 1978), where managers join with others to learn from the results of their actions. Olsson *et al.* (2004) have developed the concept of adaptive co-management and have emphasised its focus on learning-by-doing, its role in bringing together different knowledge systems, the collaboration it promotes at community, regional and national levels, and the management flexibility that it conveys.

There is clearly a requirement for scientific advisers to be independent and free from undue pressure. That does not mean, however, that advisers must operate completely independently of stakeholders. Fisheries scientists require information from stakeholders and must be aware of the nature of the fishery and conversant with the details of fishers' activities. Serious management problems may develop where expert advisers are ignorant of important aspects of a commercial activity, as became evident during the Foot and Mouth epidemic in the UK (Anderson, 2002). There is also the post modernist issue of the nature of 'independent' advice and the role which should be played by experts, as well as the issue of the weight to be given to local ecological knowledge held by stakeholders themselves.

Wilson (2007), as part of the SAFMAMS project, has reviewed literature on the science-policy interface. He emphasises that the boundary between scientists and those involved in policy formulation must be recognised and respected. However, the boundary must be porous. The purpose in recognising the boundary is not to maintain scientists' authority. The boundary is there to make a contribution to democratic decision-taking. Wilson believes that there is an important distinction to be drawn, on the one hand, between statements about nature which can be established *in principle* as objective facts and, on the other hand, statements about shared meaning. Science must be respected. However, in policy areas where the science is uncertain it may be difficult to determine where the boundary of science lies. In these circumstances scientific deliberations need to include people other than scientists if policy is to be successful. A key finding to emerge from Wilson's review is the idea that boundary organisations are important. Others have noted the emergence of organisations along the policy/science interface which serve to facilitate communication and bring science and policy together.

The North Sea Commission Partnership was one such boundary organisation, which operated very successfully. The RACs may play a similar role but there is some evidence that they are not as effective at bringing scientists and fishers together. This is not surprising as it is not their chief function.

### **The Operation of the RACs**

It was evident from the three workshops with representatives of the RACs that participants believed that these new organisations had already shown themselves to be successful in providing advice from stakeholders to the Commission and Fisheries Council. There were no participants who wished to go back to the time before RACs existed, and some believed that pre-existing organisations like ACFA were now redundant and could be dispensed with. Fishers and other stakeholders did not have time to participate in organisations which were not yielding results.

The workshops also confirmed that the mix of different interests and stakeholders within the RACs had contributed to their success. Although fishers had initially been sceptical of the value of including wider interests, most of them now acknowledged that the inclusion of others had been beneficial. Those other interests had initially been concerned at being in a minority with respect to fishers, but they acknowledged that the search for consensus within the RACs had been an important moderator. It had given their views some authority.

There was some concern that the RACs might be trying to assume too wide a role. There was a view that they could not involve themselves in all aspects of the CFP; that the RACs should concentrate on providing advice from stakeholders. That was their main function. That was what had been lacking from the system previously. Their role was to provide advice to the Commission and Fisheries Council on fish stock management including advice on TACs and quotas, bringing forward the expertise and experience of fishers and other interests. The RACs should bring in fisher's own assessments of the state of stocks and provide information from skippers on how they would like to deal with discards and other problems arising within the fisheries.

Nevertheless, it was accepted that if the RACs were to represent the voice of stakeholders and to give sound advice then they needed the assistance of experts to translate ideas into the format understood by fishery managers. The RACs also needed supporting evidence for their proposals, much of which could only be provided by experts. However, the RACs did not just need evidence and scientific advice on the state of the stocks, they required a wide range of expert assistance, including help from social scientists and economists.

It was evident that the Commission had not been providing sufficient funding to meet the current aspirations of the RACs in terms of the availability of expert advice. It was also apparent that the scientists and other experts who could provide that advice already had a heavy workload. There was increased pressure on experts to support different structures, including ICES, STECF, and now the RACs. The same scientists were often serving all three organisations. There was a need to prioritise their efforts and to manage the provision of evidence and advice so that all the requirements were met as efficiently as possible. Such rationalisation could only be achieved by an overlapping of operations between these different structures.

### **Interactions between scientists and stakeholders**

Concern was expressed at the workshops that the RACs had not been given sufficient resources to obtain expert advice of their own. Moreover, the current financial structure of

the RACs did not allow them to obtain those resources from elsewhere. Some fishers felt strongly that the RACs did need funding to enable them to employ their own independent scientists. It was also necessary to complement existing data with new data from the RACs to make the advice more credible.

There was recognition, however, that the task of obtaining independent advice was almost insuperable. Even if independent advice could be obtained it was considered doubtful whether that advice would be accepted by the Commission. Instead, a mechanism was needed which would achieve the necessary integration of scientists and other experts into RAC working groups.

It was agreed that advice on fisheries management should be based on scientific, economic and social information rather than political considerations. However, there was a danger that the Commission would take a rather narrow view over the admissibility of data and scientific advice from outside the ICES community. There was always a risk that RAC advice would be disregarded by the Commission unless it was supported by ICES or STECF experts. It was accepted that not all scientific advice was objective. Data quality varies enormously and some very poor fitting of data was being carried out even within the ICES community. There needed to be an element of quality control and peer-review with respect to the science. Nevertheless, scientists could benefit enormously by gaining help from fishers in acquiring data and getting the science right, and there were definite advantages in considering advice from a wide range of sources. Moreover, it was not possible to carry out a truly independent scientific review as there was a limited pool of expertise and the science had become unduly institutionalised.

The solution being sought was greater engagement between the RACs and the system for collating and providing expert advice. A means had to be found for integrating stakeholders into the process for obtaining and providing expert advice for managers, without it being a one way transaction. Fishers could provide additional valuable information and should be willing to engage in partnerships with scientists and other experts to improve the quantity and quality of the information available to managers. However, the penalties that fishers might face in engaging with scientists had to be minimised. Equally, scientists should be prepared to expose their work to greater scrutiny by stakeholders; such scrutiny might be inconvenient but it had great value. There was also a need to allow for input from a wider range of experts to the advisory process, and for the independent sector, including university science, to be strengthened and admitted to discussions.

It was proposed that the RACs themselves could achieve a great deal in terms of promoting collaborative research between scientists and fishers. The current system allowed only data from recognised sources to be admitted to ICES and STECF Expert Groups. It was currently difficult to transpose information from fishers or from independent sources into the system. There were also long delays in admitting new information into the process. However, there was a need to allow a flow of new and up to date science into the system. These improvements could be achieved by allowing the RACs to engage more closely with the system for providing expert advice.

What kind of additional information could the RACs bring to the table? Perhaps their main contribution would be to obtain objective estimates of actual catches and landings. Currently, information on the quantities of fish caught and landed were often poor and inaccurate. Increased cooperation in providing a much wider range of data was also necessary and could only be provided by fishers. Fishers could assist by promoting further data collection, including surveys in which fishing vessels participated. They could also provide information on the way the fishery operated, how fishing gears were deployed, the areas in which young fish might be found, spawning areas and a wide range of information which would be valuable in managing the fisheries.

RACs had already been allowed to participate in the work of ICES and STECF Working Groups as observers. Their input had been valuable and there had been no detrimental consequences. The RACs could perhaps engage even more fully by proposing modifications to the current system for providing scientific advice. A useful model was the SEDAR system of participation which had developed in the eastern USA, although there might be other relevant examples from elsewhere. SEDAR first involved the setting up of a data workshop where data-sets were compiled, documented, analyzed and reviewed; second, an assessment workshop where quantitative population analyses were developed and refined; and finally a review workshop where a panel of independent experts scrutinised the data and assessments and then made appropriate recommendations. There was close correspondence between that system and the current proposals for reform coming from ICES. Under the new arrangements proposed by ICES their Expert Groups will meet, on a regional basis, to transform knowledge into advice. Essentially, the responsibility for preparing advice will fall to the level of the experts themselves. Advice from the Expert Groups would then be inspected by a Review Group, which will conduct peer review and which might send back advice for revision or strengthening. Bolting a data workshop on to the front of that process would enable each RAC to engage with the Expert Group through a detailed discussion of the data available and its fitness for purpose. That could be the first step in a much closer engagement of stakeholders leading to the admission of a wider range of information, resulting in more comprehensive and sound advice.

## **Best Practice Guidelines for Scientific Advice on the Management of Fisheries within the Common Fisheries Policy**

We can now complete a series of recommendations on how the preparation of expert science can be improved to enable better management of fisheries under the CFP at the regional seas level:

Management itself, and the collation of advice to achieve better management, is best achieved at the local or regional level. That is, at the spatial level that encompasses the most relevant factors and involves all those who need to be involved. Severe penalties accrue when management is conducted at a global level, without being able to take account of local factors.

The Common Fisheries Policy is currently too complex. There is a need for simplification and rationalisation of the management structures. Some existing structures are standing in the way of progress and should be removed. There may be a case for establishing Regional Fisheries Councils, bringing together those Member States with a particular interest in a regional sea or particular fish stocks

Greater participation by stakeholders in the preparation of advice for fisheries management is essential. Participation increases the legitimacy of the advice. It promotes buy-in to the process itself. It also ensures that the experience of stakeholders is fully recognised. Increasing pressure to involve stakeholders in decision-taking has emerged not just because scientific advice has failed but also because there are real advantages to be gained from public dialogue over critical scientific issues.

The RACs are currently providing a strong and successful mechanism for engaging stakeholders in fisheries management. They have the support of stakeholders and have already changed the way that management is conducted. However, attention should be devoted to their structure and financing to ensure their continued efficacy.

Reforms are necessary to advisory structures to introduce stronger regional elements. The new ICES Expert Groups should be regionally based and should interface with the appropriate RACs. Similarly, STECF should be structured to take account of regional issues.

Expert advisers must be independent and free from undue pressure. That does not mean, however, that advisers must operate completely independently of managers or stakeholders. Fisheries scientists, economists and other experts need to be conversant with the requirements of fisheries managers. They also require information from stakeholders and must be aware of the nature of the fishery and the details of fishers' activities. Serious management problems may develop where expert advisers are ignorant of important aspects of a commercial activity.

Experience with the North Sea Commission Fisheries Partnership has shown that there are major advantages to be gained from promoting direct dialogue between fishers and scientists. Many scientists welcome open discussion of fish stock assessments with fishers. Their experience has been that fishers are able to challenge pre-conceived ideas and that dialogue is beneficial to both parties.

Dialogue between experts and stakeholders must not be one-way. Cooperation is not just a matter of fishers providing additional valuable information and then being excluded from further discussion. Experts must be prepared to expose their work to greater scrutiny by stakeholders; such scrutiny may be inconvenient and uncomfortable but it has great value.

Inquiries into the political application of scientific advice (including the UK Inquiry into BSE, and Canadian inquiries into the collapse of the northern cod fisheries) have shown that safeguards are necessary to ensure that scientific advice is objective and fit for purpose. The need for advice must be anticipated; expert advice must be drawn from a variety of diverse sources and not from a select group of specialists; specific measures must be taken to ensure the quality, integrity, and objectivity of advice; uncertainty and risk must be assessed, communicated and managed; there must be openness and transparency; and the impact and validity of the advice must subsequently be reviewed.

Experts tend to show allegiance to particular paradigms. They need to be exposed to alternative views. Much of the advice on fisheries management comes from scientific institutions which are owned and funded by government fisheries managers and which have a narrow perspective. A number of studies have shown that there are benefits to be gained from widening the scope of expert advice to include a range of different disciplines from diverse sources. Under the CFP there is currently a need for a wider range of inputs to the advisory process. The independent sector, including university science, should be strengthened and admitted to the discussions.

A mechanism has still to be found to integrating stakeholders, independent scientists, and indeed other experts including economists and social scientists, into the advisory process. It is suggested that a three stage process will be necessary. First, a data workshop should take place, where data-sets are compiled, documented, analyzed and reviewed. Secondly, an assessment workshop is necessary, where quantitative analyses are developed and refined. Finally, there is a need for a review workshop where a panel of independent experts scrutinise the data and assessments and make appropriate recommendations. All three stages should be completely transparent and should involve a wide range of participants.

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