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Science in support of the European fisheries and aquaculture policy

SCAR-Fish, the Strategic Working Group on Fisheries and Aquaculture

Content

Introduction

The reform of the Common Fisheries Policy marks a new European fisheries management based on new principles that must be implemented and carried to success.

In this process knowledge building is essential: To understand the interaction between our economic activities and the ecosystem, to advice on how we get the most out of it and to push the frontiers for European utilisation of aquatic natural capital. This is a challenge to be shared between the public setting and controlling of the targets and the fisheries and aquaculture industries' strive to optimise production within the given targets.

SCAR-Fish is a policy driven strategic group advising Member States and the Commission on how to make research policies and research themes instrumental in the delivery of the new European fisheries policy. The report also provides an input for the new European framework programme Horizon 2020.

In the section "*The European science orientation"* SCAR-Fish advices on how science can support the new fisheries policy. The section "*The European science organisation",* takes up the issue of organising European advisory work in a cost effective way.

Terms of Reference (ToR) for SCAR-Fish are in annex 1. The SCAR-Fish web address is *http://ec.europa.eu/research/agriculture/scar/scarfish_en.htm*

It has not been possible in this paper to take full account of either the library of best cases for fisheries management or the treasury of scientific knowledge. A number of initiatives and projects are closely related to the reform of the CFP. These are described in the Annex 3.

In a long term perspective a foresight mechanism for European fisheries and aquaculture policy will be an invaluable tool for optimal and sustainable aquatic food production. SCAR-Fish has initiated a foresight-mechanism.

While SCAR-Fish takes full responsibility for the content of this report, we would like to give thanks and credit to the resource persons and institutions for contributions provided.

Conclusion and overarching recommendations

The objective of SCAR-Fish is to establish a targeted and efficient knowledge base for policy and industry to make the visions of the CFP into reality. Three overarching strategic tools are highlighted.

1. **Organise and coordinate policy related science.**
   A coordination of the work of advice providing bodies will alleviate fragmentation of

research, support focus on policy related science and enable a cost efficient deployment of science and advice. The providers of science and advice should establish a coordinating facility and the users of advice should initiate a yearly consulting in order to ensure alignment between policy and funding on the one side and science and the advisory system on the other.

Science is a fundamental tool for progress in our understanding and management of marine resources, science must be given the best possible access to its raw material: Data. It is a policy responsibility to establish real time access to high resolution data. Lack of progress in this area may stall the CFP implementation.

The Basic Regulation requires Member States to ensure input to the scientific and advisory process. This commitment to should be supported by a periodical review.

2. **Meeting the future on own terms.**
   A Fisheries and Aquaculture Foresight Platform should be established to underpin a long term strategy for aquatic food production.

3. **Science supporting the CFP should be seen as part of a supply chain.**
   For science and innovation to succeed in feeding management it must be user driven. It must be responsive to the needs put forward, and it must provide new solutions that management and industry may benefit from.

   Policy related science should be integrated with the relevant policy institutions on EU, regional or national level. Programmes funding policy related science should be aligned with policy issues identified in policy institutions.

SCAR-Fish point to the following concrete challenges that should be given priority in order to underpin a successful transition to the new Common Fisheries Policy.

1. The “choke species” problem will be a very visible consequence of the new policy in many fisheries. Full catch accountability and the landing obligation (the discard ban) entail that mixed fisheries must stop when the quota for the least plentiful species is exhausted; hence the lack of quota for the “choke species” will result in some quotas in mixed fisheries not being fished. Dealing with this problem requires a comprehensive approach including implementation of MSY in a multispecies context, innovation of selective fishing methods and a TAC/quota management based on the newest data.

   The Regulation on Technical Conservation Measures and the Control Regulation have to be revised as a consequence of the catch accountability and discard ban established. The function of the new regional cooperation, especially in context of multiannual plans must be considered too. The development of fisheries practises, management methods on EU, national and community basis should be supported with regard to scientific knowledge, technology, new fishing methods, market alignment, establishment of cooperating structures, including third countries and conceptual development of the implementing

legislation.

2. Data collection and data management is at the same time very costly and very important to fisheries management. Transparency, the logistics of cost efficient data handling and real-time availability should be improved, and data sampling from commercial vessels prioritised.

   The Data Collection Framework have been using exception rules extensively to prevent access to data for bodies formally charged with provision of scientific advice, to researchers and to the public. This practise must stop.

3. The landing obligation raises two question in relation to the fish brought to land. The use of fish not suitable for human consumption must find a proper alternative use in order to generate wealth instead of financial losses. Secondly the removal of biomass hitherto discarded at sea will have a consequence for the food availability for species like birds, crayfish etc. The development here should be monitored carefully.

4. Boosting aquaculture production is vital to the European food supply. The CFP offers an opportunity for Member States to establish coherent national policies building on optimising aquaculture production within defined impact limits inter alia through breeding programmes. The development in Member States should be supported on basis of the objective of increasing production.

Policy considerations

Management advice based on science is a cornerstone of the CFP. The reformed CFP requires more data and more areas - such as ecosystem considerations, to be covered by data. Also the discard ban and the resulting “choke species” issue require better advice in terms of analytical and real-time qualities and with regard to manageable options when choosing MSY solutions.

Two policy issues are at stake: Getting the knowledgebase necessary to comply with the CFP objectives and providing the industry with advice that reflect the strength and composition of the stocks they fish on.

Science is used for the EU policy and management, it is largely produced by independent institutions but the competences, human resources and infrastructures are largely provided by Member States. Marine science cooperation is widespread in the European area. Still, fragmentation, institutional barriers and differences in priorities leave the science production less efficient than possible.

The Basic Regulation requires Member States to collect all data necessary for fisheries management. Member States must coordinate data collection with other Member States, with

the Commission and with third countries in the same region. The collection, management and use of data shall be cost-effective.

This report points to the priority of better organising of science and advice and a consultancy instrument aligning policy priorities with science and advice.

SCAR-Fish offers a number of concrete recommendations regarding science and innovation priorities relevant for the European Commission and EU Member States. EU Member States should take account of these in context of national science programmes. These should also be considered by the Commission and MS in the implementation of EU programmes and the European Maritime and Fisheries Fund (EMFF)

A foresight

1. Background

The Foresight process helps provide insight and tools to shape strategies and explore new ways forward. Foresights help prepare for the future, but also to shape and create it. Foresights involve a systematic approach to understanding and engaging the future.

To enable aquatic based production to cope with complex and interlinked challenges, such as unsustainable consumption of natural resources, climate change, increasing globalisation and societal priorities the understanding of future scenarios are important in ensuring that the right questions are asked for the right solution to be developed, and that a follow-up process ensures alignment between policy, knowledge building, and management.

2. A preliminary foresight for fisheries and aquaculture

The main issues of the CFP and of global fisheries policy relate to our understanding of the ecosystem and to the way we affect and use it. The reform of the CFP entails a fisheries management where catches of fish as well as effects on the ecosystem are accounted for and kept within acceptable limits. For aquaculture the Water Framework Directive (WFD) and the CFP must play together.

The major drivers for a development supporting this objective are

- Science to reveal the function and thresholds of the ecosystem
- Changes of the environment - including climate, influencing the base line for aquatic production
- The implementation of management on basis of the reformed CFP and the Marine Strategy Framework Directive (MSFD)
- Clarity on the boundaries and the administration of the WFD
- Technology and methods allowing the industry to prosper from and protect the ecosystem
- Human endeavour and how it is affected by public management, market requirements and societal and economic incentives.

The Commission's green paper preceding the policy work on the CFP has illuminated the main challenges for the reform, and the reformed CFP addresses the immediate critical action points. Overfishing, discarding of fish and the resulting poor state of fish stocks and loss of wealth stands ahead in the work for the reform of the CFP.

SCAR-Fish will initiate a comprehensive foresight mechanism aiming at qualifying megatrends relevant to fisheries and aquaculture management.

SCAR is preparing foresight guidelines and, SCAR-Fish has sent a discussion paper (annex 6) as a basis for the SCAR work on foresights.

The European science orientation

1. The situation in EU fisheries and aquaculture

Europe needs a high and sustainably sourced supply of fish. As much as 65% of the consumption is currently imported. The magnitude of this imbalance threatens EU's position in a global food security perspective. The Natural Capital discussion at the Rio+20 Conference in June 2012 has underlined the efficient use of the natural capital as an important parameter for global competition.

Europe's fisheries do not achieve the potential yield of fish stocks. A large portion of the catches taken are discarded or not used optimally and the cost of fishing is excessively high due to overcapacity in fleets. In aquaculture, production is stagnating due to complex rules and lack of planning and coherent management.

Science and technology in Europe is at the international forefront with regard to quality, skill and financing. At the same time the knowledge base for stock management is inadequate and for objectives such as the integration of ecosystem effect it is not capable of providing sufficient models or data for management. The effect is that the value output of resources is sub-optimal, the environmental protection inadequate, not sufficiently assessed and possibly wrongly prioritised.

From an organisational point of view science and advice in Europe is fragmented among a large number of institutes, and financing sources, including various funds and programmes.

Data are fundamental for science and advice, and more data will be needed as the ecosystem effects are included in management. Data collection is expensive. There is no European data platform that allows an open and structured access for scientist to relevant data, and attempts to establish a more intelligent and cost effective sampling and distribution of data are weak.

The fishing sector suffers from fleet overcapacity, overfishing is a diminishing but still considerable problem and public micro management is standing in the way of optimal production. However the requirement of full catch accountability and a landing obligation in the reformed CFP is likely to change incentives and induce a high demand for new methods and technology from the fishing sector.

European aquaculture has a high level of environmental sustainability and high animal health and consumer protection standards. However, the cost of ensuring a safe product should be observed. European science and technology for aquaculture lie in the forefront worldwide. In spite of this EU aquaculture is stagnating while FAO estimates that aquaculture is and will remain one the fastest growing segments of the global food industry.

Many EU member states lack a coherent national aquaculture policy and the inconsistent interpretation and application of the Water Framework Directive by national, regional and local authorities make authorizations of new sites in many Member States difficult or unpredictable.

In conclusion the EU fisheries and aquaculture policy has not been performing well and the challenges are sizeable. So are the perspectives opening with the reformed CFP.

1.1 Core elements of the reformed CFP

In some areas the CFP establishes principles without defining how these should be implemented in concrete management. This is for example the case in relation to the ecosystem approach and the implementation of MSY. In these cases the development of knowledge should take place in context of both the requirements on short term and ambitious objectives on the long term, thus offering policy and management a pathway for continuous improvement.

An Ecosystem Approach to Fisheries (EAF) and MSY

The CFP's Basic Regulation defines an ecosystem-based approach as follows: *"'ecosystem-based approach to fisheries management' means an integrated approach to managing fisheries within ecologically meaningful boundaries which seeks to manage the use of natural resources, taking account of fishing and other human activities, while preserving both the biological wealth and the biological processes necessary to safeguard the composition, structure and functioning of the habitats of the ecosystem affected, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems;*

The Marine Strategy Framework Directive points to limits in the form of *"good environmental status*" to be observed: *"Marine strategies shall apply an ecosystem-based approach to the management of human activities, ensuring that the collective pressure of such activities is kept within levels compatible with the achievement of good environmental status and that the capacity of marine ecosystems to respond to human-induced changes is not compromised, while enabling the sustainable use of marine goods and services by present and future generations."*

It is not possible to manage the ecosystem. We must manage fisheries in respect of the ecosystem. In relation to a development of management tools for an Ecosystem-based Approach to Fisheries (EAF) the following structure is used:

Primary ecosystem effects relate to utilisation of commercial species. MSY is embedded in this concept.

MSY is the guiding principle for the utilisation of commercial fish stocks. *"maximum sustainable yield' means the highest theoretical equilibrium yield that can be continuously taken on average from a stock under existing average environmental conditions without affecting significantly the reproduction process;"*

Implementing this principle in management may progress through a single stock approach over a multispecies approach - including the aspect of species competing for the same space and food and the aspect of the food chain. The principle relates to volume in tonnes but it may be applied in economic terms too – which is relevant to discuss as MSY for the individual species may be higher or lower depending on fisheries on other stocks and on the ecosystem balance. Fishing on MSY for a forage species may for example lead to a lower stock balance and thus lower MSY for predator species. The economic result following from alternative MSY strategies will play an important role in the revised CFP.

Secondary ecosystem effects relate to non-targeted species, habitat effects and biodiversity.

Dynamic effects, prominently climate effects results in a continuous change in the baseline for ecosystem management. The ecosystem approach must address the issue of cyclic fluctuations, dynamics and trends that changes the baseline for primary and secondary effects.

Results based management and transferability

Results based management is not an objective but a management strategy focusing on performance and achievement of results. It defines acceptable impacts and leaves it to resource users to identify the means to meet the requirements and to document that impact limits are respected.

It is based on the notion that management should be decentralised to the lowest appropriate level to obtain effectiveness and equity as decisions will pertain to the interests directly involved. Furthermore decentralisation of management to the industry will establish a user driven demand for science and innovation which will strengthen the supply chain from science to sustainable growth.

Results based Management in CFP context is

1. Public management of the resource by objectives and targets beginning with full accountability for commercial catches and successively accounting for all ecological effects of fisheries (EU responsibility)
2. Public management balancing alternative utilisation patterns (regional management)
3. Removing micro management of the individual fisherman's actions and use of technology
4. Ensuring full accountability by documentation and tracing of catches and effects
5. Knowledge and capacity building for successive improvements of performance

For aquaculture the effects of aquaculture production is national competence in respect of EU directives. Results based management in aquaculture requires a translation of directives into well-defined environmental impact limits applicable to the individual producer.

The setting of targets takes place in a gradual inclusion in of all relevant impacts from fisheries and aquaculture on the ecosystem, thereby including all natural capital costs in the production function of fisheries and aquaculture. See SCAR-Fish ToR: *"advancing science and knowledge with the aim to optimise resource output of aquatic food in results based management where ecosystem effects are progressively incorporated in the management framework and internalised in the costs of the production."*

While results based management leave it to the industry to optimise the result within given limits such as quotas, transferability of quotas ensure that the fleet capacity is balanced with fishing opportunities and that vessel quotas may continuously match catches. This is especially important in mixed fisheries and fisheries with a high degree of variability.

Blue Growth and Aquaculture production

Alongside the CFP the Blue Growth agenda and the Atlantic Strategy both highlight the potential of aquaculture to deliver sustainable economic growth and employment and are important drivers for the sector. Thus, the European Commission has identified aquaculture production as an important contributor both to future food security and to the blue growth agenda. While in

some areas of Europe the aquaculture sector is well established, generally growth in the sector is stagnant.

It is recognised that challenges and opportunities exist to grow the sector sustainably across the EU, requiring the focus of research in key areas including:

- Minimising and mitigating the environmental impacts of aquaculture
- Mapping aquaculture development constraints
- Offshore aquaculture sites, including opportunities provided by co-location with renewable energy installations
- Development of waste product modelling capabilities to inform expansion of aquaculture sites.
- Development of integrated multi-trophic aquaculture
- Aquaculture of new species

Currently one bottleneck to further growth and development of aquaculture (and other marine economic activities) is the regulatory burden imposed by EU environmental legislation such as the Water Framework Directive, Bird and Habitat Directives. Extensive modelling work is required to satisfy the demands of the legislation in order to assess the impact on aquatic populations. Such difficulties are in part due to a lack of clarity on population baselines and the geographic scale of a population that is, to what extent local, regional, national or EU wide populations should be taken into account when assessing impact.

2. Science in support of the CFP

The CFP's Basic regulation is framework legislation. The success of its implementation will depend heavily on the advancing of science, on scientific advice and on innovation and technology in the industry.

In relation to fisheries and aquaculture policy, science must deliver on two levels. Supplying the required knowledge for management and industry and establishing new insights that allow management and industry to establish new approaches and methods.

The reformed CFP will require science on three levels.

1. The policy level in EU, regionally and nationally
2. The level of primary production, distribution and processing
3. Market development establishing transparency and basis for informed choices

The three levels differ with regard to challenges, user interests and funding. In the following sections the science needs are based on this three-level conception.

The CFP is science based and the Basic Regulation institute an obligation for Member States to "*carry out fisheries and aquaculture research and innovation programs. They shall coordinate their fisheries research, innovation and scientific advice programs with other Member States, in*

close cooperation with the Commission, in the context of the Union research and innovation frameworks, involving, where appropriate, the relevant Advisory Councils"

Furthermore Member States shall *"collect biological, environmental, technical, and socio-economic data necessary for fisheries management, manage them and make them available to end users of scientific data. Member States, in close cooperation with the Commission, shall coordinate their data collection activities with other Member States in the same region, and make every effort to coordinate their actions with third countries having sovereignty or jurisdiction over waters in the same region. The collection, management and use of data shall be carried out in a cost-effective manner."*

2.1 Science support for the policy level in EU, regionally and nationally

The basic policy issues relate to the establishment of a governance framework allowing the highest food output in respect of all relevant ecological limits, socio-economic issues and marine spatial planning

2.1.1. The knowledge base for the ecosystem approach

The ecosystem aspect in general

A few simple but fundamental questions arise when considering how the ecosystem aspect can be taken into account in fisheries management.

- How to devise a model that describes the relevant interactions between fisheries and the ecosystem; and how it can be made adaptive to the increased knowledge that we obtain.
- How a model may take account of dynamic ecosystem developments caused by for example climate change
- How the model can qualify decisions on acceptable impact limits on the system
- How short term issues may be addressed with present models.
- What is the data need, and how do we make sure that cost efficiency and relevance are prioritised when sampling data and prioritising model developments.

A dynamic ecosystem model is necessary. Evidence is accumulating that the increase in CO_2 in the atmosphere is affecting the global climate and increasing ocean acidification, with far reaching implications for biological processes and ecosystem services (IPCC 2007). Governments are faced with the challenge to adjust their policies to cope with the potential impacts of climate change. The pathways by which climate change (CC) affect marine populations and ecosystems are complex. The increase of seawater temperature due to global warming can directly affect the fish physiology and behaviour and the distribution of fish stocks. CC has an impact on oceanographic features such as ocean circulation patterns, wind and upwelling and biological processes and food webs. Those changes may affect fish populations even more than the direct effect of the temperature rise. Moreover fisheries may increase the vulnerability of ecosystems to CC.

Fisheries provide a fundamental contribution to our food supply. Succeeding with a high marine food output is not only depending on fisheries management but also on other human activities at sea. Ecosystem effect caused by ocean acidification, pollution or other uses of the sea must be taken into account in order to assess and manage the full potential of marine food production.

The need for comprehensive answers has led to the rise of a surge of end-to-end models that aim at tying together all ecosystem factors, including impacts of climate change, relevant to fisheries management. From a management point of view a feasibility study of these models, their application and the time frame for that could provide a sense of direction and a strategic tool for overarching management decisions.

Predicting future ocean ecosystem states, and managing towards optimal condition and performance, will be difficult with traditional approaches built on the use of historical abundance and production patterns. Targeted research into altered and altering ecosystems is of the essence, so that future ecosystem states can be understood more clearly, and translated into more effective management. Only with a more solid understanding of ecosystem dynamics and its impacts on ecological context can the trade-offs among fished stocks be understood well-enough to make choices that work best for fish and for fishing communities.

Management has not succeeded in ensuring sufficient ecosystems resilience. This could be improved by reducing stressors and setting clear management objectives so as to maintain marine ecosystems within acceptable limits.

If quantitative relationships between drivers of change and status of the ecosystem are unknown, but a qualitative understanding of these relationships and thresholds is available (data-poor /moderate systems), ecological risk analysis can be used to mitigate the perceived risks.

SCAR-Fish recommend designing a knowledge grid for ecosystem effects as a direct consequence of fisheries. The grid should:

1. *Have a structure allowing it to develop from a situation where effects are related in simple interactions to a higher degree of complexity*
2. *Be gradually developed based on solid data and qualified assessment of the effects of fisheries*

The progression of the knowledgebase grid should be developed according to a cost benefit analysis allowing an efficient prioritisation of science funding.

- *SCAR-Fish recommends that the condition and resilience for the major EU marine ecosystems be characterised with regard to stability, thresholds, and drivers. Key research investments need to be identified to fill knowledge gaps and expand the model applications to allow scenario planning for ocean states and impacts on fisheries. The following should enter into this work:*
- *Assess key predator-prey relationships with an eye towards identifying key production bottlenecks and the factors that control those, including both fishing and non-fishing risks.*
- *Analyse empirical data on ecosystem metrics against drivers (e.g., fish density) to characterize ecosystem thresholds that are related to fishing intensity.*
- *Consequences of regime shifts for species abundance and food web interactions.*
- *Ways to disentangle the role of CC from the exploitation of marine resources on changes in ecosystems and fish stocks.*
- *Assess possible application of end-to-end ecosystem models such as.*
- *Assess the need for relevant ecological risk analysis in data poor systems and consider management strategies such as 'balanced harvesting' in this context.*

SCAR-Fish underline, that the deployment of research into ecosystem effects caused by other factors than fisheries, but with a consequence for marine food output, should be prioritised,

reflecting their growing effects on the ecosystem and its ability to provide food from the marine environment.

SCAR-Fish recommend that EU science in context of a new European science organisation combine forces with academic and management scientists from different sea basins to promote synergetic thinking and accelerate progress.

MPA

The Marine Strategy Framework Directive (DIRECTIVE 2008/56/EC) states that MPA's are an important contribution to the achievement of good environmental status and that representative networks of marine protected areas, adequately covering the diversity of the constituent ecosystems shall be established. Next to protecting the environment the MPAs' shall secure the capacity of the ecosystems to support the provision of goods and services.

Direct "sanctuary effects" on stock restoration should be taken into account when considering MPA's. In certain circumstances where MPA's delimitate stock components they may serve as a tool to optimise the total output of these components otherwise managed as one stock. It should be borne in mind however that optimisation is a sensitive matter requiring efficient coactions between management and practical fishery.

MPA's may result in loss of fishing opportunities. And it may enhance opportunities. As the conservation priority will be strong in MPA's an outcome serving both purposes require three fundamental principles to be observed:

1. Scientific advice must focus on defining acceptable impact limits and ways of optimising resource utilisation.

2. Management must be designed according to results based principles, allowing the industry to innovate low impact fisheries that meets the targets.

3. MPA's must be monitored and adapted to ensure that objectives are met over time.

Recent international experience has shown that current MPA networks and "essential fish habitat" protection programs make important contributions to stock recovery, but that those programs are poorly integrated with overall fishery management goals and systems.

SCAR-Fish recommends:

- *That current MPAs and MPA networks be assessed as to their goals and contributions to fisheries productivity and biodiversity protection. The opportunities to use MPAs to scale fishing in both the Northeast Atlantic and in the Mediterranean should be assessed. International habitat protection programs and fisheries ecosystem plans should be assessed in this context.*

- *That a science- management paradigm is developed to serve the implementation of the dual purpose of the MPA networks.*

MSY- application

According to the CFP proposal the regional bodies shall develop and recommend conservation measures including multiannual plans and the application of MSY. MSY is by definition a yield

concept. In multispecies context MSY should be fixed to obtain the desired optimal catch compositions taking into account both the prey predator relationship as well as the obtainable species composition in catches. In other words if in certain situations more yield can be gained from one stock by fishing another stock beyond its individual MSY reference point this is a sensible way to go. However an ecosystem based precautionary level must always prevail. This condition may lead to a biomass target above or below B_{MSY} depending on the concrete circumstances.

The CFP application of MSY is limited by the present scientific basis. And the consequences of a more comprehensive application of the principle in relation to catch opportunities for Member States (Relative Stability) and market demand are not clear. The knowledge base for the MSY implementation should be expanded in context of a policy discussion regarding the prioritised MSY opportunities, including choke species issues on a regional or sea basin level.

SCAR-Fish recommends that science establish a basis for dialogue with relevant policy levels with a view to identifying opportunities and priorities regarding MSY implementation and ecosystem balancing on a sea basin level or sub level. Projects have already been initiated, but there seems to be a lack of policy inclusion.

The role and challenges of Regional management

The reformed CFP is likely to be more decentralised, enabling decision making to be made at a more regional level. This allows for the design and implementation of management measures by those most familiar with the fishery.

The structures responsible for the development and implementation of regional fisheries management are not yet clear, though the roles of Member States and relevant Regional Advisory Councils are expected to be strengthened. To some extent, depending upon the role of RACs in regionalised management, building up the scientific understanding of stakeholders within the RAC will require effort from the scientific community.

While management measures will need to conform to the general principles laid down in the new CFP, the range and diversity of management measures across EU waters is expected to increase. Consequently, the scientific advice on which management measures are based may also be required to change to this more diverse and regional structure.

SCAR-Fish recommends to

- *Create scientific capacity to provide advice on region-specific management challenges. Such regional science capacity would be structured to 'nest' in the new EU fisheries science framework.(See part III The European science organisation)*
- *Establish a choice model as a tool for managers to assess consequences of alternative objectives and strategies. The model should build on,*
    a. *Setting of goals and priorities, including stock sizes, configuration of biomass to be harvested and prioritising conservation needs*
    b. *Defining decision criteria and application of management tools, including reference points, limits, quotas etc. and assessment of effects of management steps such as harvesting plans, use of non-damaging gear or spatial management.*

c. Assessment of the performance relative to the objectives

SCAR-Fish notes that regionalisation of fisheries management provides a basis for the development of Fisheries Ecosystem Plans (FEP).

CFP application in areas with high species diversity

The reformed CFP and the ToR for SCAR-Fish rest on the notion of a management based on extensive knowledge regarding proper catch levels of commercial species and the expectation that sufficient knowledge regarding secondary effects can be provided. The policy also builds on the premise that fishermen have a substantial influence on the composition of their catches.

In some areas, notably the Mediterranean fisheries are very diverse, both in terms of the species caught and the fishing methods and gears used.

About 80% of the EU Mediterranean fleet is composed by small vessels (< 12 metres that catch numerous species of fish). Those fisheries play an important role into local communities from an economic and social point of view. Bottom trawl fisheries are characterized by the multi-species nature of their catches and by exercising a high fishing pressure on the younger age groups for most of the species and, in many cases, on immature fish.

Generally, for the Mediterranean area, biological data and analysis of the most important commercial species are carried out and available only at GSA level (Geographical sub areas), which - as recommended by the General Fisheries Commission for the Mediterranean (GFCM) and its Scientific Committee – represents the best combination of areas, fishing methods and resources in their variable relations. The Mediterranean is divided into 31 GSA (Establishment of Geographical Sub-Areas in the GFCM area amending the Resolution GFCM/31/2007/2).

Also in the Mediterranean Sea the climate change as a factor influencing the structure of the ecosystems is relevant: the tropicalisation and the propagation of lessepsian species (species migrating through the Suez channel) are widely observed

Most of the scientific activities are carried out in the framework of Data Collection Multi-Annual Programme (DC-MAP), and non-EU countries in the Mediterranean are also engaged in setting up a similar system of monitoring and data collection. Much work is done through FAO sub-regional projects (Copemed, Adriamed, Medsudmed and Eastmed) that involve non EU countries in common assessments of shared stocks, cooperation, exchange between researchers of both sides, and training activities necessary in order to achieve a common framework of science and research on both sides of the Mediterranean (EU and non-EU countries).

SAC (Scientific Advisory Committee of GFCM) need a scientific basis to be put in a position to provide scientific advice, based also on an evaluation of different management scenarios, adequate to set up multiannual management plans for shared stocks and other fisheries.

It is necessary to develop science and management in order to find intermediate solutions and to develop workable management approaches in areas with high species diversity and limited knowledge for the reformed CFP.

SCAR-Fish recommends that

- *The basis for TAC advice be considered on a multispecies basis*
- *Fisheries should be defined at a multispecies –multi fleet basis and fishing effort limits at the multispecies level should be developed.*

Ecosystem effects of the fisheries be considered in spatial terms using rotational areas fishery management with the aim to reduce the impact on the sea bed and restore fishery sustainability. Knowledge gaps to be filled:

- *Identification of stock boundaries. The GFCM has established management areas based on political and statistical considerations rather than biological or economic ones. The assessment and the consequent management have been done at GSA level, but stocks are not limited to GSA's. We have to identify the related boundaries for a more consistent management; correct stock unit definition is crucial and considered a prerequisite for any scientific stock assessment approach and reliable fisheries advice from it.*

- *For transboundary fish stocks, exploited by more than one country, the following is relevant:*
  - *Knowledge of population biology and the identification of population units;*
  - *A common collection of data on stocks and fisheries, within the framework of an international program;*
  - *Representative and standardized data on commercial fisheries, both in terms of fishing effort and catches, to evaluate at regional level the impact of fisheries on the shared resources;*
  - *Genetic features of population subunits should be investigated to clarify relationships among populations;*
  - *In the context of Ecosystem Approach a common map reporting both bathymetric, substratum features and biocenoses including inshore and offshore areas should be established;*
  - *Coupling of hydrological information with biological data should be improved at regional level;*

- *In general formation is needed to apply the ecosystem approach.*

A strict TAC/quota application depends on sufficient analytical scientific advice for commercial fish stocks and for the setting of boundaries for bycatches and other ecosystem effects.

In areas with high species diversity and a complex fleet structure science and management have substantial problems in a short term establishing of a TAC/quota management.

It is necessary to develop science and management in order to find intermediate solutions and to mature the management in areas with high species diversity and limited knowledge for the reformed CFP.

SCAR-Fish recommends that

- *Alternative management methods should be developed to ensure adequate protection for species where the analytical basis for TAC/quota management is not yet sufficient. Such models may include*
  - *Management using reference points and indicators*

- *Effort and area based management*

Implementation of the Marine Strategy Framework Directive and Natura 2000

The ecosystem approach is also embedded in The Marine Strategy Framework Directive (MSFD) and Natura 2000.

MSFD requires Member States to move towards good environmental status on basis of eleven descriptors of which 5 relate directly to fisheries and aquaculture: 1) Biological diversity, 2) Non-indigenous species, 3) Populations of exploited fish are within safe biological limits, 4) The marine food webs at normal abundance and diversity, 6) Sea-floor integrity at a level that ensures the functions of the ecosystems.

The directive also calls for spatial protection measures in the form of networks of marine protected areas, adequately covering the diversity of the ecosystems.

In implementing the directive Member States face challenges in relation to both translation of the directive requirements into management tools and to the setting of proper indicators and targets for the management.

The aim of the Natura 2000 network is to assure the long-term survival of Europe's most valuable and threatened species and habitats.

The main issue seem to be the balancing of fisheries activities and conservation needs. It is a question of translating the directives into concrete management that balances the objectives of protection and food production.

Another issue is how protective measure could be implemented. Closures, bans and other restrictions are known management tools. They may exclude development of technologies and methods that for example could harvest fish or mussels without negative effects on the habitats. Result based management in protection of habitats, and biological diversity could be considered even if it is more difficult to apply here than on stock management.

The MPA chapter above discusses these aspects of spatial management

2.1.2. Implementing the basic principles of the reformed CFP

The obligation to count and land all catches

The reformed CFP entail a gradual change towards result based management with full accountability and a de-regulation leaving more management decisions with the industry

The transition must be implemented carefully in order to ensure that deregulation is properly replaced by incentive mechanisms and self-control. Furthermore new challenges regarding the requirement to match catches with quotas and to land all fish has to be addressed.

The CFP is setting some deadlines for full accountability and the implementation of the landing obligation. It is possible for fisheries or in management areas to establish on trial basis models for the new management, including relevant simplification of regulations and control.

SCAR-Fish recommends that

- *A databank on issues related to results based management is established. This may be done in context of existing projects such as Ecofishman.*
- *Large scale trials and assessments be conducted to evaluate and underpin workable solutions of full accountability and compliance with the landing obligation*

New methods and technologies, fishermen's real time sharing of catch information etc. are factors in the work to optimise the resource utilisation. European Fisheries Technology Platform www.eftp.eu provides a common European approach on Innovative Fisheries Technologies from research to production outlining the key issues for a strategic European innovation. EFTP could function as the overarching strategic and operative forum in the European area for this work

Transferable Fishing Concessions

TFC's offer a number of opportunities, challenges and pitfalls. The concrete design is crucial. A facility advising Member States on TFC application could be considered. In USA Environmental Defence Fund successfully has established a "design centre": *http://blogs.edf.org/edfish/2010/10/19/catch-share-design-manual-and-online-design-center-provide-guidance-for-fishery-managers-and-fishermen/*

2.1.3. Advice on exploitation patterns including TAC/quotas

The setting of TACs is an essential management instrument in the CFP. It has been the focus point for the industry to ensure the optimal use of the resources and for NGO's to safeguard the resources.

The CFP introduction of full catch accountability may deliver precise catch data and a quality leap in advice. At the same time precision of advice will be even more important for the industry as full accountability entail that mixed fisheries must stop when the quota for the least plentiful species is exhausted (choke species). This is in contrast to management today where over-quota catches are legally discarded.

The precise TAC management is a hinge factor in pursuing the objectives for the CFP. Today advice on data-limited stocks, outdated advice and insufficient assessment models result in inadequate management of fish stocks. Lack of data has been counteracted by including increasing precautionary margins in the advice. While this may be relevant from a precautionary point of view in the given situation it is counterproductive to the objective of MSY.

Advice in relation to TAC management is dependent on national institutes, their cooperation and input to the international advice provided by ICES is paramount to the result. The issue of organising and providing advice is dealt with in chapter III.

The advisory systems, especially ICES, have in acknowledgment of the relevance of industry input a close dialogue with industry representatives. Often discussion relate to the reliability of data. Given the knowledge of fishermen, science might benefit from a participatory industry approach based on closing the data gaps and developing the qualitative industry input to modelling and interpretation of data.

The issue of “data poor” stocks may be addressed in context of organisation and cost efficiency. It may also be considered on a more fundamental basis taking into account the best possible alignment between science processes and management processes leading to TAC’s. Science might change calendars; management might change the quota year for some species, in- year TAC-updates might be considered etc.

Another issue to consider here is the outlook for emerging sciences that may contribute to cost effective advice. Recent advances in DNA technology provide a range of cost effective monitoring of primary and secondary ecosystem effects. These methods have a potential to enhance monitoring practises in the future.

Scar-Fish recommend the following actions to deal with the problems of data-poor stocks.

- *The relevant stocks should be assessed with regard to the cost/benefit aspect since data collection and analytical costs are much lower for data-limited assessment methods in comparison to data-rich assessment methods. Data-rich assessments should however be the rule and data-limited assessment the exception.*
- *New assessment methods - "data-limited methods” that do not require long data records and can be done rapidly and cheaply have been developed in recent years. These methods should be explored in context of cost/benefit. For stocks where the benefits of analytical assessment outweigh the cost roadmaps for their inclusion in such assessment should be established.*

An important aspect of data is real time catch reporting e.g. with electronic log-books on board the fishing vessels. Given the development in management and in technology an ICES WG might provide a valuable input regarding:

- *An optimal collection of data with regard validity and real-time quality.*
- *Best utilisation of data available including those for straddling stocks*
- *Use of data from commercial vessels complying with full catch accountability.*
- *An advisory process delivering continuous advice based on real time computation of data.*
- *Prospects of new methods taking advantage of new technologies – e.g. DNA sequencing.*
- *Possible changes in the management mechanisms of setting and revising TAC’s.*

2.1.4.The maritime policy

The competition for space in the oceans is markedly increasing, and a maritime policy including spatial management is an important issue on the table. It is beyond SCAR-Fish’s remit to advice on maritime policies and science needs for that. However, as the Integrated Maritime Policy seeks to provide a coherent approach to all maritime issues it also encompasses some aspects related to fisheries and aquaculture (e.g. spatial planning of maritime activities and data collection) where SCAR-Fish can provide advice. Moreover these should include a cross-cutting approach to research to ensure fisheries and marine aquaculture the proper place in this development. It is necessary to provide area based knowledge regarding the importance of fisheries and aquaculture for food supply, local communities and wealth generation in general.

2.1.5. Science and advice supporting the basis for aquaculture

Aquaculture

Aquaculture is the fastest growing food producing sector worldwide, with Asia accounting for almost 90% of global production. In contrast, growth of the sector in the EU is stagnant. Yet aquaculture has the potential to grow, providing quality sustainable produce to the consumer, supporting coastal communities and employment while alleviating fishing pressure. As well as providing greater sustainable food security, aquaculture has been identified as a key sector in the European Commission's Blue Growth agenda, supported also by the reformed CFP and the EMFF.

One of the aims of the reform of the CFP is to promote aquaculture through a coordinated approach based on non-binding strategic guidelines, common priorities and exchange of best practices. The Commission is working to identify the relative starting positions and different circumstances of the Member States and to identify possible common priorities and targets for the development of sustainable aquaculture activities.

So why is the sector languishing across Europe? There are a number of identified constraints which inhibit growth of the sector in the EU:

- A lack of suitable aquaculture sites
- Inconsistent planning systems and administrative burdens associated with licensing consents for aquaculture farms.
- A pre-dominance of SME businesses (90% of the sector) that struggle to access finance to expand or explore innovative opportunities to boost businesses.
- Poor competitiveness of the sector in some parts of the EU.

Aquacultural research should receive a significant boost under the Horizon 2020 framework given the significance of the sector under 2 of the identified early Focus Areas of the Horizon 2020 work programme; Sustainable Food Security and Blue Growth. SCAR-Fsh has considered areas of research most relevant to both these objectives:

Blue Growth – providing growth in the marine economy and sustainable employment opportunities within a competitive sector. Research should focus on facilitating the growth and innovation of the sector and reducing barriers to investment:

- Mapping of marine constraints to identify potential aquaculture sites. Provide the right tools for an integrated approach in management; develop decision-making tools to appraise the economic, societal and environmental costs and benefits of different uses of resources so as to inform marine spatial planning.
- Development of streamlined licensing system with particular focus on proportionate environmental consents procedures.
- Development and piloting of innovative aquaculture; larger offshore sites, co-location with marine installations, multi-trophic aquaculture etc.

- Development of a methodology for integrated multi criteria assessment of cultivation and market perspectives in order to identify high potential species, including new species, for aquaculture given local environmental and marketing conditions.

- Increase the understanding of markets for fish and fish products in order to improve competitiveness and satisfy consumer demand through local production and processing.

It is clearly essential that research work under the Blue Growth theme is carried out though a cross-cutting approach and with the involvement of the industry to ensure that research is grounded on developing economically viable outcomes which will genuinely contribute to growth of the sector.

Sustainable Food Security – providing a safe, healthy product to meet growing demand while minimising impacts on the marine environment. Research should focus on:

- Analysis, risk assessment of developing production technologies, for example waste dispersal modelling for larger scale aquaculture sites, improved cage design for offshore sites to minimise/prevent escapees/predator attacks.

- Developing methods to facilitate traceability of produce via certification and labelling schemes as guarantees of sustainability of production and safety for consumption.

- Developing reliable early warning systems in order to develop strategies to minimize the impacts on HABs and biotoxins on aquaculture and enhance the safety of aquaculture products.

- Understanding of viral, bacterial and parasitic diseases, including innovative means of treatment such as ozonation for viral inactivation or use or cleaner wrasse to remove ecto-parasites.

- Investigate the potential for genetic improvements and production efficiency traits.

- Development of sustainable fish feeds with high nutritional value.

The European Commission, Joint Research Centre has completed a study on performance indicators as a policy support. The report is available on https://fishreg.jrc.ec.europa.eu/web/fishreg/aquaculture

In June 2013 The European Fisheries and Aquaculture Research Organisation (EFARO), in its role as an association of research institutes active in the field of scientific support to fisheries and aquaculture policies, proposes priorities in research that will strengthen the European aquaculture sector http://www.efaro.eu/default.asp?ZNT=S0T1O-1P159

2.1.6. Compliance, documentation and control

The signature of a sound policy is that industry incentives work for the policy and not against it. Optimising the economic benefit should go hand in hand with the objectives of a high and sustainable food production. This will establish a proper level of compliance. The industry is responsible for the product it sells. Market documentation of product characteristics such as sustainability criteria is an increasingly important element for a sourcing fish based on sustainable practises.

The public control of European fisheries and of fish supplied to the European market remains for the foreseeable future a decisive element of the policy. The present control is costly; it

depends largely on physical appearance of manpower and expensive equipment as ships and airborne control. At the same time new control and documentation systems has been developed, such as the Control Regulation's requirement for full traceability and the development of traceability systems integrating data traceability with data validation through CCTV onboard fishing vessels.

This development allows for more cost effective controls and an alignment between public control, market documentation requirements and certification schemes.

Fighting IUU (illegal, unreported and unregulated) fishing is a priority for EU, and controls, traceability systems and certifications should developed to take account of the specifics of fish imported from possible IUU sources.

Scar-Fish recommend that the development of a cost effective intelligent control be considered in the following areas:

- *The organising of control could be aligned with the documentation and traceability systems already in place or under development. The aim could be to establish a one-string documentation that serves the market and the public control at the same time. Furthermore the control could gradually be integrated in the supply chain, and costs be borne by the industry.*

- *Smart technology could be tested on a larger scale.*

- *Cost effective use of DNA tracing could be developed to help control IUU and imports of fish to Europe and to document species composition in fish silage produced on board from the discard fraction that now has to be landed.*

- *Conducting the actual control could take place on basis of intelligent information systems for example by defining systems of predictive policing and risk based control.*

The establishment and use of international agreements and codes are important in reinforcing the policy. This is outside the remit of SCAR-Fish.

2.1.7. Evaluating the success of the obligation to land all fish (the discard ban)

The landing obligation is a pillar in the new CFP. It is important that the performance and effects of this new management approach is evaluated with a view to learn and improve in context of the policy implementation which will take a number of years.

SCAR-Fish recommend that a reporting of the function of the landing obligation is prepared. The report should include method and speed of implementation, compliance, changes in behaviour and fishing methods, changes in fishing mortality and catch composition and learning lessons with regard to management tools applied.

2.1.8. The global perspective

EU shall participate in the work of regional fisheries management organisations and international multilateral bodies in order to strengthen and enhance their performance in the management and conservation of international fish stocks. In order to achieve this, the Union shall advocate best available science-based positions, contribute to the development of scientific knowledge, and cooperate to strengthen compliance in the international context.

The perspectives of engaging EU in third country development of fisheries management has gained increased interest. Given the substantial EU imports of fish and the standing of European fisheries and aquaculture science and technology an EU positioning on this might be to the advantage of global management as well as EU sourcing of fish.

The united forces of DGMare and DG-Devco might be a new driver for a policy focusing on optimising the global food output from aquatic resources, ensuring an economical efficient and fair distribution of the wealth and define a level playing field with regard to marketing and sustainability. The World Bank/FAO document *"The Sunken Billions"* strongly point to institutional innovation of fisheries management as the primary driver for wealth generation.

The perspectives of engaging EU in 3rd country development of fisheries management has gained increased interest. Given the substantial EU imports of fish and the standing of European fisheries and aquaculture science and technology an EU positioning on this might be to the advantage of global management as well as EU sourcing of fish. However the convincing argument for this must be provided by the policy of the reformed CFP.

SCAR-Fish recommend collaboration between Commission services on a review and appraisal missions in support of global sustained development with a view to supporting policy development. The programme shall support a policy development focusing on optimising the global food output from aquatic resources and ensure an economical efficient and fair distribution of the wealth.

2.2. Science and innovation in the primary production and processing

Result based management will induce increased industry focus on ways to optimise earnings within the limits set by public management.

2.2.1. Innovation of methods and technology in fisheries

As the CFP gradually transfers micromanagement to the industry it is important that innovation and development is linked to business opportunities, including green growth, relevant to the industry. The development of management methods and technology in this area is crucial for a well-functioning and smooth transition to the new policy. A European Fisheries Technology Platform supports this objective. It is important that EFTP gives priority to issues related to the reformed CFP. Methods and technologies which can facilitate sampling and utilisation of data from commercial vessels for scientific purposes should be a part of this.

2.2.3. Innovation of methods and technology in aquaculture

Science and innovation on aquaculture in EU must be focused on developing and markedly increasing aquaculture competitiveness and production in a supply chain context, where the reductions of the environmental costs are high on the agenda.

The European Aquaculture Technology and Innovation Platform http://www.eatip.eu/ supports the sustainable development of European aquaculture. EATIP currently work on visions and science priorities for aquaculture and EATIP may serve as a platform for promoting and prioritising research and innovation within the European community.

2.3. Science and innovation in support of the market

Sustainable and wealth generating fisheries are not just about managing fish stocks. Fishing comes with extra costs' associated with the broader range of limits that the fishery must optimise its result against.

In the same way European aquaculture production must account for costs related to limits on effluents and other ecosystem effects.

The use of our natural capital should be accounted for in full by the user and reflected in prices. The market appreciation of the inclusive values accruing from a sustainable use of our natural capital will establish the link between the true costs of production and market demand.

It is outside the scope of SCAR-Fish to advice on marketing strategies and immaterial values. However documentation and traceability must be highlighted as necessary prerequisites for a transparent market well informed to take the proper decisions. Ecolabelling may serve as a vehicle for this.

Documentation and traceability have already been established as a main feature of the CFP.

A new challenge is appearing, the landing obligation (the discard ban). Handling, processing and marketing of accidental catches pose a new and unknown problem. An important factor for the CFP landing obligation to work is that accidental catches of undersized fish and of non-targeted species contribute to wealth rather than being a cost associated with fishing.

SCAR-Fish recommends

- *To support initiatives that relate to handling, product innovation and marketing of accidental catches, including possible solutions for marketing fish under minimum conservation reference size for human consumption*
- *To accelerate the knowledge base for documentation, traceability and certification*
- *To developing standards and marketing in support of products where all environmental costs related to fishing or aquaculture production are included in the price for the product.*

The European science organisation

1. Background

The need for increased science and advice to underpin the CFP within the financial constraints requires a cost/effective organising of science and data collection.

At present there is a range of organizations that utilize scientific expertise and data to provide advice to policy clients. These advice providing bodies include, inter alia, ICES, STECF, ICCAT, NEAFC, NASCO, GFCM etc. The advice providers communicate individually with clients and have their own arrangements for handling advisory requests.

It is almost universally the case that the advisory bodies rely on the voluntary provision of scientific expertise from largely government funded marine science institutes. While there may be formal arrangements between clients and advisory bodies (e.g. an MoU as is the case between ICES and the European Commission) on service provision, there is no system at present that proactively manages the use of expert resources by the advisory bodies. This leads to a disconnection between the needs of the policy customers, the advisory bodies and resource providers with consequent lack in efficiencies and strategic direction.

The challenges to be addressed in relation to the efficient and effective use of experts in the advisory process are twofold:

1. That the overall pool of experts and the specializations available are progressively becoming insufficient to cover the increasing demand for advice.
2. That the demand for advice and the resulting demand for experts is increasingly ad hoc and dynamic. The major part of the advice and the need for experts still relates to recurrent advice that is given on an annual basis and can be planned in advance. However, the addition of new demands on the already fully utilized expert base requires extensive planning, exchange of information, and revision of existing processes both in institutes and in the advisory bodies.

For its part, ICES is presently developing a Resource Coordination Tool (ICES RCT) facilitated by interactive web solutions to deal with these challenges in context of it's own work. STECF is developing a related system.

There may be advantages in bringing the various elements of the current advisory system including the ICES RCT into a unified and integrated process that would improve the linkages between the various bodies so that there would be a coherent mechanism both for the operation and strategic use of resources. This process must be flexible enough to handle the needs for planned advice and dynamic use of science resources. The process must encompass the major providers of advice.

The elements in a coordinating function could be considered to cover the following:

<u>Compile and summarize</u>

a. Availability: the capacity and experts made available through the institutes that employ these experts (Expert Providing Bodies- EPB)

b. Needs: the capacity and experts needed by the Advice Providing Bodies (APB) to address the advice needs of their clients

Resolve

a. Align the capacity provided by the EPBs and the capacity needed by the APBs, minimize duplication of efforts, and optimize the use of available experts, where possible.

Recommend

a. Develop strategic planning that provides advice for data collection and managing the expert work force, and necessary infrastructure.

b. Identify key strategic science priorities needed to support policy

The strategic issues such as science and advice priorities, funding issues and requirements for dealing with dynamic requests should be presented to expert funders and resource providers in a yearly consultation with a view to aligning requests for science and advice with policy priorities and funding. EU Member States' general directors and the Commission discussed improved science as a precondition for the future CFP and management decisions 6th March 2012. Future consultations on this issue could take place in context of the bi-annual EU fisheries general directors meetings.

- *SCAR-Fish takes note of the ICES RCT system under development and invites ICES to establish contacts with relevant Expert Providing Bodies, for example through EFARO, and with other Advice Providing Bodies with a view to developing coordination and cost efficiency on a broader scale.*

- *SCAR-Fish recommends that issues related to cost/efficiency of science and to science priorities in relation to the CFP are discussed between the policy and science level on a recurrent basis.*

2. A European data platform

The collection of marine and fisheries data is fundamental to the provision of scientific evidence and advice for fisheries policy and management. It implies not only personnel but also research facilities and infrastructures, including research vessels, data centres, etc. Research vessels are essential platforms for the collection of data. However they are very expensive to maintain and operate.

The reformed CFP will require more extensive use of data in order to establish an ecosystem based fisheries management. Other EU law, including the MSFD increase the demand for data collection and monitoring. These policies must develop in an integrated manner. For this to succeed it is necessary to integrate financing and structures of the data systems. A truly integrated maritime policy can only be established if the data structures supporting the policy are integrated.

Most of the existing infrastructures to collect data on fisheries, including research vessels, has been established on a national basis and sustained mainly through national budgets; lately the Data Collection Multi-Annual Programme (DC-MAP) has covered a substantial part of the monitoring costs.

The DC-MAP has sought to improve co-ordination in sampling to increase the efficiency. Nevertheless there is still scope to further improve the co-operation between MS to avoid

overlap and duplication of activities, and to increase efficiency of the resources and the effectiveness of efforts at national level.

The CFP is likely to become more regionalised, and the MSFD is focused on regions. This offers the opportunity and challenge to develop cooperation and coordination at regional level between MS and institutes responsible for monitoring to improve the cost efficiency of data collection. The development of regional cooperation programmes could be leverage to a more efficient use of infrastructures for data collection.

The Commission green paper "Marine Knowledge 2020" includes a multi-resolution digital seabed map of European waters by 2020. It should cover topography, geology, habitats and ecosystems and include by data on human activities, by their impact on the sea. All this should be easily accessible and free of restrictions on use. It should be nourished by a sustainable process that progressively improves its fitness for purpose and helps Member States maximise the potential of their marine observation, sampling and surveying programmes.

Collection of data is of limited use if it is not fully accessible to science. According to the Aarhus Convention environmental data – including removal of fish and impacts of fisheries on natural habitats - shall be available to the public. The DC-MAP has not followed this principle as exception rules in the regulation have been used extensively to limit access to data for bodies formally charged with provision of scientific advice, to researchers and to the public. The availability of data with high resolution is crucial to scientists if they are to provide science based advice on the interactions between fisheries and marine ecosystems including impacts on bottom habitats as for instance specified under descriptor 5 in the Marine Strategy Framework Directive, to delineate boundaries for marine Natura 2000 areas and to advice on measures to delimit impacts on marine habitats.

SCAR-Fish recommends

- *That the Council Of Ministers commits to transparency of high resolution fisheries data collected for management, control or scientific purposes.*
- *That Member States undertake to cooperation on the efficient use of heavy infrastructures such as research vessels; and to establish regionalized data collection and forms of presenting data.*
- *That Member States undertake to establish where possible single string data collection on areas where reliable fisheries data are or can be made available.*
- *That data collection from commercial vessels for scientific purposes is given priority.*

Annexes

1. Terms of Reference for SCAR-Fish
2. SCAR-Fish letter to www.efaro.eu and answer from EFARO
3. EFARO viewpoints on the future science structure
4. ICES viewpoints on the future science structure
3. Overview of science projects supporting the CFP-2012
4. The CFP Foresight

Annex 1

SCAR Strategic Working Group (SWG) on Fisheries and Aquaculture
Terms of Reference

Based on a reflection paper highlighting the objectives and EU added value for enhanced R&I coordination in fisheries/aquaculture, the SCAR plenary agreed on the establishment of a policy-driven SWG in that field.

Overall objectives

Fisheries and aquaculture products are on the global scale an important component of food security. However, aquatic production highly depends on healthy and productive marine ecosystems. The Common Fisheries Policy (CFP) is one of the most science-based policies in Europe. The new reform calls for European fisheries and aquaculture to be more sustainable, and by moving towards an ecosystem based management.

The main research challenge for ocean based food production is to understand the marine ecosystems functioning and based on such understanding to develop new fisheries harvest strategies and to improve aquaculture production systems which on the one hand are sustainable and on the other hand promote the pursuance of optimal utilization of the food potential by the industry itself

This remains the main challenge up to 2020 because the starting point in Europe is the one of overexploitation and erosion and changes of marine ecosystems in particular due to climate change.

The basis for the work will be the revised Common Fisheries Policy.

The Commission under the 7th Research Framework Programme (FP7) contributes to address these challenges by funding dedicated research projects. However, the budget allocated by the EU to fisheries and aquaculture research only represents a modest part of the effort allocated by Member States. Together, the Ministries, research councils and research Institutes of the EU countries invest around €200 million annually in fisheries sciences (MARIFISH final report). This represents a very significant investment and the ministries in charge, in the Member States are responsible for the management of a substantial body of scientific knowledge on European marine fisheries and aquaculture.

The objective of this new SWG is to further develop collaboration between Member States on a more long-term basis. It is expected to achieve potentially significant improvement such as doing economy of scale, avoiding duplication and improving research efficiency at EU level, sharing research results, linking existing work more closely, and jointly funding strategic areas.

Although several research networks, Associations, Committees and International Organisations play an important role in promoting research at EU level, they mainly represent the scientific community and the industry and are de facto end-users of the EU research programmes and related budgets. None of them includes ministry representatives and has the capacity to define strategic research agenda and/or to mobilise national funds for launching joint initiatives between Member States. There are also funding organisation collaborative activities such as

SEAS-ERA and the Oceans Joint Programming Initiative, but the memberships of these are much wider than the fisheries and aquaculture ministries.

Term of references

The SWG would help to link the national donors, ***primary the Member States' ministries in charge of fisheries and aquaculture,*** with the European Commission, to develop collaboration beside the existing structures including facilitation of co-operation between existing and new collaboration instruments and initiatives.

Focus of the work

More specifically, the SWG would carry-out the following tasks in order to link fisheries and aquaculture policy with innovation and research policy and funding:

- *Advise the Commission and MS on research policies and research themes, with a view to better coordinate these activities,*
- *Conceptualise a structure for advancing science and knowledge with the aim to optimise resource output of aquatic food in a result based management where ecosystem effects are progressively incorporated in the management framework and internalised in the costs of the production,*
- *Create a better framework for development of cost-effective scientific methods to help implementation of Natura 2000 strategies and the Marine Strategy Framework Directive securing sustainable harvest of biological resources and clear positive effects for the ecosystem,*
- *Take initiatives for improving cost-effective scientific input to fisheries management,*
- *Coordinate and prioritize the need for analytical assessment of commercially exploited stocks, including data-poor stock, especially regarding short lived species*
- *Assess the potential for the sustainable development of aquaculture in the EU,*
- *Mapping and foresight exercise following SCAR process on main trends affecting the two sectors at medium and long term,*
- *Contributing to implement Horizon 2020 challenges by reflecting on key innovation and research priorities to support policies and industry development,*
- *Coordinating positions on recent initiatives such as the Joint Programming Initiative on "Healthy and Productive Seas and Oceans" and new and on-going and new marine ERANETs e.g. SEASERA, new ERANETs on marine biotechnology, seafood chain,*
- *Launching joint initiatives for sharing research infrastructures (research vessels);*
- *Maintaining regular dialogue between MS and with the Commission (RTD, MARE, ENV) in order to create more synergy and to enhance co-operation between the different initiatives.*

Composition and qualifications

The SCAR members will investigate in their institutions and/or parallel institutions whether the respective Member State is interested to take part in such initiative and possibly to name a contact person. A key element will be the identification of the right people in such a working group i.e. that are working in the ministry in charge of fisheries and aquaculture and have the knowledge needed to make the science-policy link. They should not represent research institutes – such expert input to the activities of the SWG will be requested on ad hoc basis. A consultation will be launched after the SCAR-WG meeting on 25 JAN 2012 to seek for SCAR countries participation.

Coordination: Denmark

Annex 2

10th July 2012

Letter to EFARO

Dear Maurice Heral

SCAR has established a strategic working group for fisheries and aquaculture to advise the Commission and Member States on research policies and research themes, with a view to better coordinating these activities. The ToR are annexed. The key objectives relevant to EFARO are the obligation to initiate cost effective scientific input to the implementation of the CFP.

On the other hand JPI Oceans aims at enhancing the coordination at EU level of national programmes and efforts in marine and maritime research. In order to achieve this aim JPI Oceans is going to develop a Strategic Research and Innovation Agenda (SRIA), identifying areas where JPI Oceans can add value to the European landscape (including capacities related to infrastructure, monitoring, data collection and capacity building which all indeed are cross-cutting in nature) to create synergies across sectors and disciplines, including fisheries and aquaculture.

We invite EFARO to give relevant comments, and we specifically ask EFARO to:

I. Consider and comment on a cooperative structure for European research institutes, that:

1. Set up a framework structure for cooperation and coordination of research institutes work related to fisheries and aquaculture management within the European Area.
2. Set up a framework for a gradual phasing in of concrete areas for cooperation where decided
3. Define cooperation and coordination on specific relevant areas, including:
    a. Establish a comprehensive and expandable data sampling structure that can serve the growing need for incorporating ecosystem effects in management. It is essential, that cost efficiency is given high priority and that a practical framework for data sampling from commercial vessel is included in a progressive manner. The perspectives of implementing new technology (ROV's etc) and open access to data – including real time data should be considered.
    b. Ensure the efficient participation in relevant international bodies, especially in the advisory work of ICES, and CGPM (FAO) and its scientific bodies
    c. Plan investments and utilization of research infrastructures – especially, but not limited to, research vessels. The ambition could be to establish a common pool management or even a Eurofleet organisation. EFARO should consider possible corporation with institutes not being members of EFARO and the relationship to other relevant fleet components and fleet coordinating bodies.

We ask that EFARO produce an opinion by 1st February 2013 which gives SCAR-Fish and JPI Oceans a solid basis for its advice with regard to structure, timing and results that can be expected on a, b and c

II. Assess cost-effective scientific methods to help implementation of Natura 2000 and the MSFD

Scar-Fish sees this work as a lex specialis of the ecosystem based fisheries management, given that ecosystem based management must relate to areas relevant in context of habitats, biodiversity etc. SCAR-Fish will discuss this issue with EFARO at a later stage.

III. Take note of the ToR regarding data-poor stocks

We invite EFARO to comment on the issue taking into account short term and long term perspectives.

IV. Other

EFARO is invited to comment on the portfolio of sciences that can be activated to benefit the future CFP. The application of the ecosystem approach will be a lengthy and data costly process. There seems to be a need for knowledge about the cost/efficiency of the data sampling, monitoring and management needed to integrate the ecosystem approach in a structured and cost-effective manner.

In conclusion, the SCAR-Fish aims at producing a comprehensive yet focused and operative report on the topics covered in the ToR. In the case of JPI Oceans the intention is to elaborate a SRIA and an implementation plan to be decided upon by the Management Board of this JPI. In this capacity it could also be interesting if you have input or ideas on other infrastructures which can support fisheries and aquaculture research and management taking into account the major technological breakthroughs amongst others in monitoring during the past decades.

We look forward to our mutual cooperation on this.

Best regards

Sign.

Mogens Schou Kathrine Angel-Hansen

Ref : EFARO/2012-277. IJmuiden, September 5, 2012

To Mogens Schou
SCAR-Fish working group
Slotholmsgade 12
1216 Copenhagen
Denmark

Subject : Scar-Fish

Dear Mogens,

Thank you for your letter requesting input from EFARO on your working group. The issues you raise are of considerable importance to EFARO members and we welcome the opportunity to respond to them. As you may be aware EFARO has for some time been engaged in discussion, both with ICES and the Commission (DG-Mare) on developing the European Advisory process, which touches on some of the fundamental questions of co-operation and efficiency that SCAR is seeking to address. I enclose a recent working paper prepared for the EFARO working group on the advisory process for your information and which may be of interest to you. I should stress that this does not represent an EFARO position, but it is work in progress and does illustrate many of the issues that are of importance to our members regarding the scientific advisory process.

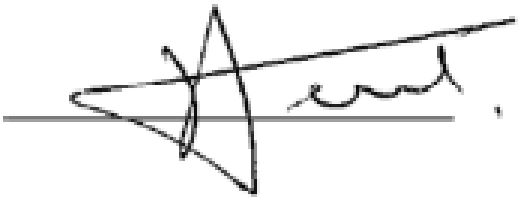
Regarding your specific request to comment on a cooperative structure for European research institutes we would be happy to prepare a document for you. As you can imagine this is a complex issue that may have sensitive national implications and we feel that it will be necessary to start a process of discussion with our members to seek a consensus. We would like to convene a workshop later this year to prepare a report for you and it would be very useful if you or a member of your group could participate to ensure that we have a shared understanding of the task. Alternatively, perhaps a representative of EFARO could attend one of your meetings as an observer to ensure commonality of purpose. The workshop will address ideas to increase cooperation mainly at the regional level between our members and address the following points: database management, sharing common facilities like research vessels, and where it is desirable to develop new technologies.

With regards to the implementation of Natura 2000 and the MSFD, we are presently developing some proposals for combining fisheries and ecosystem surveys with environmental monitoring under the ICES umbrella to help our members in implementing these in a useful and well-coordinated way. We are also in the process of finalizing a paper on strategic science priorities, which I will send you as soon as is it prepared.

EFARO secretariat – Haringkade 1, PO Box 68 1970 AB IJmuiden, Netherlands. josien.steenbergen@wur.nl
Legal Address: 155, rue Jean-Jacques Rousseau, 92138 – ISSY-LES-MOULINEAUX, FRANCE

I very much appreciate the opportunity to assist in the work of SCAR and look forward to a fruitful outcome.

Yours sincerely



Maurice Héral
EFARO president

Attach: EFARO discussion paper on the advisory system

Annex 3

Contribution from EFARO to SCAR- Fish regarding the future advisory process.

Background

At present there is a range of organizations that utilize scientific expertise to provide advice to policy clients including, *inter alia*, ICES, STECF, ICCAT, NEAFC, NASCO, GFCM etc. These advice providers communicate individually with clients and have their own arrangements for handling advisory requests.

It is almost universally the case that the advisory bodies rely on the voluntary provision of scientific expertise from largely government funded marine science institutes. While there may be formal arrangements between clients and advisory bodies (e.g. an MoU as is the case between ICES and the European Commission) on service provision, there is no system at present that accounts for and proactively manages the use of expert resources by the advisory bodies. This leads to a disconnection between the needs of the policy customers, the advisory bodies and resource providers with consequent inefficiencies and poor strategic direction.

There would be substantial advantages in bringing the various elements of the current advisory system into a unified and integrated process that would improve the linkages between the various bodies so that there would be a coherent mechanism both for the operation and strategic use of resources.

Resource Management Board

Perhaps the key to a more efficient system is to create a process that is jointly owned by all major stakeholders who recognise, collectively, that a shared service will better fulfil their needs than the current complex of bodies operating with relatively weak co-ordination. The continued existence of all current organisations in the advisory process is expected. Indeed regionalisation within the CFP may well result in even more bodies seeking or providing advice so that any new arrangements will need to be flexible enough to adapt to changing demands. In order to promote better co-ordination and strategic planning we propose the creation of a Resource Management Board (RMB) that is jointly owned by the advice providing bodies, APBs (e.g. ICES, GCFM, STECF etc) that would:

a) Compile and summarize:
    a. Availability: the capacity and experts made available through the institutes that employ these experts (Expert Providing Bodies - EPBs)
    b. Needs: the capacity and experts needed by the APBs to address the advice needs of their clients
b) Resolve:
    a. Align the capacity provided by the EPBs and the capacity needed by the APBs, minimize duplication of efforts, and optimize the use of available experts, where possible.
    b. Identify mismatches between the needs and availability of experts that cannot be resolved through interactions between the RMB and individual EPBs.
c) Recommend:

a. Develop recommendations on how to resolve these mismatches that cannot be resolved through interactions between the RMB and individual EPBs
b. Develop strategic planning that provides advice for data collection and managing the expert work force, and necessary infrastructure.
c. Identify key strategic science priorities needed to support policy relevant to the range of APBs and their functions.

Recommendations are directed to representatives of the governments and the EU that fund the experts employed by the EPBs (i.e. the Expert Funders EFs. We suggest that these EFs are organised in a Governing Council (GC) to allow for efficient decision making to address the challenges and recommendations identified by the RMB.

The RMB would comprise the senior officers from each APB who are responsible for the operation of their advisory programmes. Its work would be aided by a secretariat with an effective and streamlined interface to the institutes that provide the expert resources to the advisory systems.

The RMB would be accountable to the Governing Council above. This GC would comprise of senior officers that represent the EFs (including e.g. the EU Commission). A simplified membership may be possible, if groups of EFs were represented by umbrella bodies..

The RMB would act as the focal point for requests for advice from policy clients and manage the process for dealing with them. Clients would determine which advisory body should provide the advice. The RMB would not be the advisory body and the current advisory organisations would continue to issue advice according to their remit. The Board would enter into Service Level Agreements[1] (SLAs) with institutes that provide the experts and data for the advisory process so that available resources were documented and could be matched to requests. The RMB would discuss both with clients and resource providers on the handling of a request especially in instances of potential overlap or scarcity of resources. The RMB would prepare an annual operating plan for the approval of the GC that documented how advice would be provided given the resources available. They would also prepare a report on how, at the end of the year, advisory requests were met, identifying expertise gaps and resource limitations.

Through the implementation of resource management systems and dialogue with both clients and resource providers, the RMB would prepare strategic planning documents that could be used by stakeholders (e.g. the resource providers) to develop and plan the expert resource base, data collection and use of infrastructure. It could also identify funding gaps which need to be addressed by stakeholders.

The RMB would require secretariat staff to carry out its day-to-day functions. These staff would comprise the same posts already extant in the current advisory bodies. As appropriate, some of these posts (perhaps only on a part-time basis) would function as part of the RMB in the form of a Shared Secretariat where integrated working is necessary. It might be expected that some posts from the different advisory bodies would be co-located in the same office while remaining under the legal employment of their parent organisation. This arrangement would be expected to provide a unified secretariat service that would organise expert groups in a co-ordinated way to ensure adequate staffing and rational scheduling of work. The Secretariat would monitor the use of

[1] The SLA is a non-contractual understanding of what each party will provide in terms of resources and service. It is entered into voluntarily and in this context is intended to improve planning and use of resources for the mutual benefit of each party.

resources set out in the SLA. It would alert mangers to potential over-commitment of resources and suggest solutions.

There are two options for the leadership of the RMB:

a) The RMB could be chaired by one of the Board members on a rotational basis, or
b) There could be a Director of the RMB appointed by the GC.

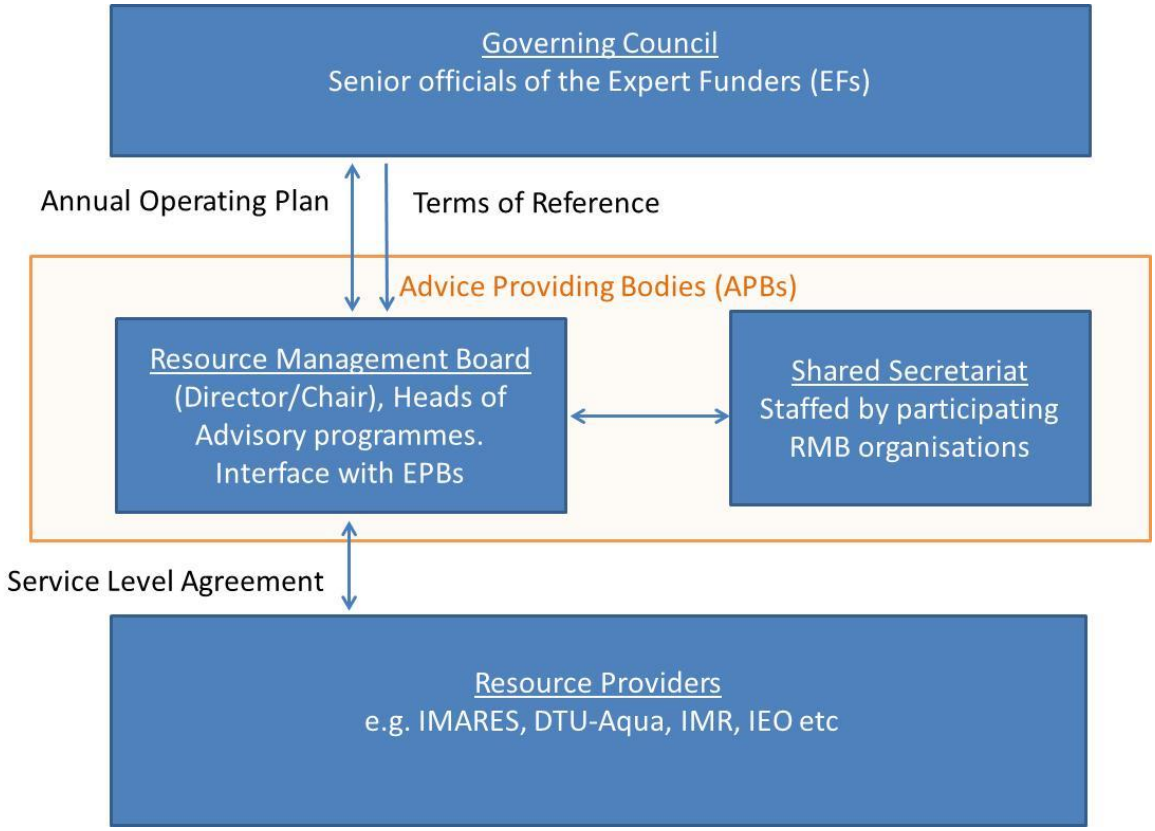
Option (a) is the simpler and cheaper option but may lack continuity and decision making capacity. Option (b) could be financed by a subscription paid by the participating organisations of the RMB. The Director would be accountable to the GC and would give the post greater decision making capacity.

There are likely to be some additional marginal costs associated with the operation of the RMB that would also be funded through a subscription. The RMB office could be located anywhere but would benefit in terms of cost and communication from being hosted by one of the existing APBs.

The major costs of advisory system are currently borne by member states and to some degree the European Commission (such as the DCF etc). These funding arrangements would not be affected by the establishment of the RMB but it would be expected that the functioning of the RMB would significantly improve value for money achieved.

This proposal has been developed to address many of the issues that affect institutes participating in European Union advisory structures. It would need to be developed further to deal with issues that affect institutes beyond the EU.

Structure and relationships of Resource Management Board. The RMB and Shared Secretariat are staffed and 'owned' by the APBs hence they are shown as lying within the orange APB box.



ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

September 2013

26 September

ICES –input to the SCAR-FISH report: Coordination of a limited resource pool of experts available to the ICES Advisory Process – a new approach

Aim

The purpose of this document is to outline a new process that ICES has initiated to ensure improved coordination of the available resources (scientist days) to be utilized by the advisory process. This includes consideration of the kind of expertise required and available, as well as an identification of areas where specific technical skills are in short supply.

For many years there has been much debate on the matching of available scientific expert resources to the proposed work plans of the advisory process. To date, little progress has been made and against a background of reduced funding in member countries, shortages of scientific experts, increased workload and the economic climate, the problem is acute and needs to be addressed.

Description of current advisory requests to ICES

The requests for advice can be divided in to three categories:

1) Recurrent requests which are those requests for advice which are stated in MoUs and specify an annual (or in some cases biannual) delivery date. This is mainly fisheries TAC advice provided to the EU, NEAFC, NASCO, and ICES member countries, as well as the Joint Russian Norwegian Fisheries Commission. The recurrent request for annual TAC advice still constitutes the largest demand for resources.

2) Requests for advice which are one-off and planned at the beginning of each year. These are mainly OSPAR requests and some special requests from NEAFC.

3) Requests for advice which have not been planned from the beginning of the year and emerge during the year. These are mainly from the EU (fisheries and environment), but also from NEAFC, and ICES member countries.

In the past nearly all advice belonged to the first two categories. However, in the last 5-10 years the third category has grown and now puts a considerable pressure on resources. This is not only because of the new resource demand. The introduction of a new process during the year is much more demanding in terms of planning and implementation because it is about finding marginal resources, and timing their use on top of a schedule which is already full for most experts and for the ACOM-Secretariat time as well.

The current advice process for the three request categories is as follows:

1. Recurrent requests and requests which are known from the start of the year (1 and 2): The planning starts with a compilation of requests prior to the ACOM consultations at the ASC. At the ASC ACOM will agree on the overall plan for these requests and the generic ToRs for the

relevant expert groups. The workplan including venues and timing of expert groups, review groups, advice drafting groups, and the ACOM finalization is then developed by the Secretariat in close consultation with ACOM and the experts involved. In this process the availability of experts is secured by direct contacts (normally email) between the experts and the professional and supporting secretaries in the Secretariat. The experts involved in this planning are chairs and stock assessors: for each expert group there is a chair or co-chairs elected by ACOM and for each stock a stock assessor (in some cases just an institute) is assigned based on last years' programme.

2. Requests which have not been planned (3): For ICES this starts with the Secretariat receiving information about a potential request from an advice client. The ACOM leadership will then discuss a possible way forward including possible proposals for modification of the request, the scope, potential experts (normally including the chairs of the relevant expert group and if relevant the stock assessor) and a potential process and timeline. If possible the request will be added to an existing process, typically as an extra ToR to an existing expert group, but this is generally not possible due to specific wishes to timing out which are out of sync with expert groups or because expert groups are already overwhelmed. The Secretariat will then contact the relevant experts directly and ask for their comments regarding the request, scope, data needs, their availability and process. These questions are then resolved through a – quite often extensive – email correspondence between the experts and the Secretariat.

Once experts have agreed to a process and timeline, the Secretariat sends a letter to the advice client explaining (if relevant) proposals for rewording of the request, the planned scope, the process including expert involvement and timeline and a budget. The advice client will then return with a letter of acceptance or questions for further clarification. When a final letter of acceptance has been received the process is confirmed to the experts and the process starts. Needs for adjustments underway are frequent, mainly due to lower expert availability than they had confirmed in the planning stage. This may lead to a need to look for alternative experts and in some cases ultimately to a message to the advice client that the delivery date for the advice will have to be postponed to match actual expert availability. In some cases adjustments also become necessary because data or models turn out to behave differently than assumed and a different approach than assumed when planning must be taken.

The Current Process – Regarding resource use / availability:

For recurrent advice regarding fisheries, the EU member states receive some funding for experts' time and travel through the DCF. ICES has no information about how member states use these funds and does not track the availability of experts on this basis.

Expert availability is presently established by direct contact between the Secretariat and the relevant experts. ICES does presently not involve those in charge of overall resource planning at the host institutes in this process as it is understood that each individual expert will follow the procedures in place in their institute regarding communication internally regarding next years' work.

Special requests which can be accommodated as add-on to existing process (as new ToRs to existing expert groups etc) are not costed to the requesting advice client. The budget for special requests which require a specific process including meetings includes travel and accommodation for the experts and can for some clients also include a component to cover salaries/fees for core experts. The Commission (DG MARE) however, does not allow the latter

with reference to a restriction in the financial regulation which requires that any new tasks with a salary component must be assigned through public tender. In those cases, the budget will only cover travel and per diem for the experts.

The Challenges

The challenges to be addressed in relation to the efficient and effective use of experts in the advisory process are twofold:

3. That the overall pool of experts and the specializations available are increasingly insufficient to cover the increasing demand for advice.
4. That the demand for advice and the resulting demand for experts is increasingly ad hoc and dynamic. The major part of the advice and the need for experts still relates to recurrent advice that is given on an annual basis and that can be planned in advance. However, the addition of new demands on the already fully utilized expert base, requires extensive planning, exchange of information, and revision of existing processes both in institutes and in ICES.

The annual recurrent advice may be addressed by developing a formalized process in the last months of the year. However, ad hoc/ dynamic advice requires a flexible and transparent mechanism of communication between potential experts, their institute leadership, ACOM, and the ICES Secretariat.

Description of the planned ICES Resource Coordination Tool

ICES is now developing a tool which will address the two challenges outlined above. The ICES Member Countries have now made a financial commitment to support the development of an ICES Resource Coordination Tool (ICES RCT). This will be administered by the ICES Secretariat. It will be accessible for use by member countries, and set up in 2013 and 2014. The tool will consist of an interactive, online facility where the potential needs for experts are posted. The experts and those in charge of expert resources in the institutes can provide feedback on the options, and all agreed expertise allocations will be continuously updated so that both individual experts and the institutes can monitor their commitments. This tool will also make it easier for ICES to provide realistic estimates about possible timelines and resource requirements when advice clients are asking about new advice requests.

In addition, the tool could also allow comparison of resource use in other organizations involved in the advisory system (e.g. the STECF). This process could identify potential duplication and find efficiencies.

ICES proposes that the ICES RCT is included to the SCARfish report, replacing the proposal for a new organization EMSAC (European Marine Science and Advice Co-Action). ICES finds that the EMSAC proposal overlaps with the ICES Convention mandate. Furthermore, ICES believes that the main aim of achieving a resource coordination tool can be achieved through simpler and less bureaucratic means than by establishing a new organization, limited to Europe.

The ICES RCT builds upon the actual demand, and avoids establishing complex procedures in situations where more simple means can be used.

The suggested SCARFish/EMSAC proposal does not address the different types of requests and tasks. It runs the risks of establishing overly complicated procedures for tasks that can be

planned well in advance and likewise burdensome procedures for tasks where flexibility and short response times are required.

The ICES RCT will be used as an interactive web application, to enable Member Countries, using their internal decision processes to:

- to register participation of experts for recurrent requests;

- to register participation of experts for special requests, received in good time.

- to alert member countries about special requests with short time frames, in order to find out about the availability of resources and the possibility to deliver within the requested time.

Apart from allowing member countries to register their experts, the tool will check the availability of the required expertise, and possible duplications in expertise. The tool will also allow for coordination among countries, and will, in a transparent way, show the use of resources by ICES throughout the year.

Final Comment

The new Resource Coordination Tool under development at ICES is a simple tool that if utilized by ICES and the institutes, should allow a more efficient and effective use of the limited number of experts. It will also identify gaps in expertise. The ICES RCT does not address all the issues associated with our limited resource pool of experts, but it makes a start in dealing with the problem, that has been around for a long time. In order to address this issue in the longer term, there is a need for a continuous dialogue between expert resource providers, expert resource users, and those who request advice.

Annex 5

Science and cooperation supporting the Common Fisheries policy

Advice

GFCM http://www.gfcm.org/gfcm/en

Consisting of 23 Member countries along with the European Union, the GFCM's objectives are to promote the development, conservation, rational management and best utilization of living marine resources, as well as the sustainable development of aquaculture in the Mediterranean, Black Sea and connecting waters.

ICES/CIEM www.ices.dk

ICES plans and coordinates marine research through its national delegates and through a large numbers of expert groups, symposia, and an Annual Science Conference. ICES is the prime source of scientific advice on the marine ecosystem to governments and international regulatory bodies that manage the North Atlantic Ocean and adjacent seas. ICES maintains some of the world's largest databases on marine fisheries, oceanography, and the marine environment, and its Data Centre is part of a global network of distributed data centres.

Cooperations

European Aquaculture Society; http://www.easonline.org/

FEAP; http://www.feap.info/intro.asp

European Marine Board; http://www.marineboard.eu/

The European Marine Board provides a pan-European platform for its member organisations to develop common priorities, to advance marine research and to bridge the gap between science and policy, in order to meet future marine science and societal challenges and opportunities.

Regional Conventions

The OSPAR Commission; http://www.ospar.org/

The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic.

HELCOM http://helcom.fi/

Barcelona/UNEP-MAP http://www.unepmap.org/

Black Sea Commission www.blacksea-commission.org/

Institutes

EFARO, www.efaro.eu

EFARO, The European Fisheries and Aquaculture Research Organisation, is an association composed of the Directors of the main European Research Institutes involved in Fisheries and Aquaculture research founded under a consensus agreement in 1989. The starting point was the desire to achieve greater cohesion and coordination of Community fisheries R + D. Today EFARO unites 3000 researchers and research assistants in 23 institutes in 19 European countries.

The European Marine Board provides a pan-European platform for its member organisations to develop common priorities, to advance marine research and to bridge the gap between science and policy, in order to meet future marine science and societal challenges and opportunities.

Technology Platforms

European Aquaculture Technology and Innovation Platform http://www.eatip.eu/

European Fisheries Technology Platform www.eftp.eu

Joint Programming Initiatives

JPI Oceans www.jpi-oceans.eu

The Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans) is a coordinating and integrating platform for marine and maritime research in Europe. JPI Oceans aims at making better and more efficient use of national research budgets. JPI Oceans is focussed on cross-cutting marine and maritime issues, including fisheries and aquaculture, and has 3 major goals: i) Enable the advent of a knowledge based maritime economy, maximising its value in a sustainable way; ii) Ensure Good Environmental Status of the seas and optimise planning of activities in the marine space; iii) Optimise the response to climate change and mitigate human impacts on the marine environment. JPI Oceans will develop joint research activities with the involvement of participating countries on a voluntary basis (variable geometry). JPI Oceans covers all European sea basins and there are 19 participating countries.

FP6 and FP7 Projects

The list below gives an overview of some of the most relevant research projects financed by i.a. FP7 and FP6 for the purpose of supporting the Common Fisheries Policy.

1. **Ecofishman** www.ecofishman.com

EcoFishMan is a multidisciplinary project, involving scientists and stakeholders in activities relating to biology, stock assessment, technology, economy, sociology and legal aspects of fisheries management. It seeks to develop a Responsive Fisheries Management System (RFMS) based on results-based management (RBM) principles for the European fisheries.

EcoFishMan will be an ecosystem-based sustainable management system that will define maximum acceptable impact (outcome target), maintaining economic and social viability. Additionally, this project measures the outcome targets through relevant indicators, develops a GIS based decision support tool and evaluates the associated cost and benefits of the RFMS. Finally a roadmap will be produced for the implementation and maintenance of recommendations in the system, validating the results in four case studies (Iceland, Portugal, North Sea and Mediterranean).

2. **COFASP ERA-NET: www.cofasp.eu**

An ERA-NET to strengthen the cooperation in European research on sustainable exploitation of marine resources in the seafood chains called Cooperation in Fisheries, Aquaculture and Sea food Processing (COFASP). The ERA-NET will work on common programmes and launch joint calls among its 26 partners from 15 countries, within the three sectors: Fisheries, Aquaculture and Seafood Processing

The objectives are to contribute to exploitation marine living resources according to the precautionary principles and to enhance innovation in and competitiveness of the entire value chain from harvest to the consumer as well as contribute to defining the science, information and data necessary to underpin the implementation of the CFP e.g. by designing complementary national research programmes and outlining monitoring and information/data sharing systems needed.

3. **GAP2** http://gap2.eu

4. **KnowSeas** www.knowseas.com

5. **Marifish** http://www.marifish.net/default.aspx

The central theme of this ERANET funded by FP6 was to 'strengthen the links between marine fisheries science and fisheries management'.

6. **MEFEPO** http://www.liv.ac.uk/mefepo/

7. **MyFish** http://www.myfishproject.eu/

Myfish will contribute to the CFP by defining management measures. The concept of MSY will be extended and integrated with the economic and social components of the society. Myfish aims at developing new MSY indicators that can ensure high levels of fishery yield while respecting sustainability.

The project will follow a regional approach and integrate stakeholders in the work with case studies in the Baltic Sea, North Sea, Western Waters, Mediterranean Sea and Wide Ranging stocks.

8. SEAS-ERA ; http://www.seas-era.eu/np4/homepage.html

SEAS-ERA (2010-2014) is a project funded by the EU FP7 ERA-NET Scheme. SEAS-ERA is a partnership of the leading Marine RTD Funding Organizations in 18 countries. In addition, a range of observers are associated with the project. SEAS-ERA aims at coordinating the national and regional RTD activities in marine and maritime research, including fisheries and aquaculture.

A more detailed list of FP6 and FP7 fisheries and aquaculture projects can be found through the following links:

FP6 projects:

http://ec.europa.eu/research/agriculture/pdf/synopsis_of_fisheries_and_aquaculture_research_projects_in_the_fp6.pdf

FP7 projects (2007-2010):
http://ec.europa.eu/research/bioeconomy/pdf/marine_sme_2011_v4.pdf

P.M. send from SCAR-Fish to SCAR

The CFP Foresight

in support of strategic policy and management decisions

According to the ToR SCAR-Fish has to do a "Mapping and foresight exercise following SCAR process on main trends affecting the two sectors at medium and long term."

Awaiting the guidelines for this process, SCAR-Fish has had a preliminary discussion on the main issues related to a foresight for the fisheries and aquaculture sector. This discussion paper is offered to SCAR as a basis for the SCAR work on foresights

1. Background

For a successful long term development of the Common Fisheries Policy (CFP) it is necessary to establish an understanding of megatrends related to natural capital management and global developments influencing such management.

The foresight mechanism must define the relevant factors assess their importance in relation to the policy and its management elements, such as science, technology and subsidies. The CFP Foresight must provide insight and tools to shape strategies and explore new ways forward. The foresight helps prepare for the future, but also to shape and create it. The Foresight must therefore involve a systematic approach to understanding and engaging the future.

To enable aquatic based production to cope with complex and interlinked challenges, such as unsustainable consumption of natural resources, climate change, increasing globalisation and societal priorities the development of future scenarios are important in ensuring that the right questions are asked for the right solution developed, and that a follow-up process ensures alignment between policy, knowledge building, and management.

2. The foresight for fisheries and aquaculture

Science and knowledge
The main issue of the CFP and of global fisheries policy relates to our understanding of the ecosystem and to the way we use and affect it. The management paradigm of the reformed CFP builds on the conception of an ecosystem where all effects may be accounted for. The foresight should qualify to what extent the scientific development will underpin this approach and to what extent new science may point to nuanced or alternative management paradigms.

The Foresight must assess the weight and importance for the CFP of the major drivers influencing the ecosystem, especially,

- Changes of the environment - including climate, influencing the base line for aquatic production

- Science revealing the function and thresholds of the ecosystem
- Science influencing the management approach to ecosystems, such as complex network theory, balanced harvesting etc.

Management as a tool to align performance with policy

Present management builds on the principle of "regulation and control" and it has developed into very detailed management without delivering the required results. The reformed CFP entail a transition to results based management. This transition will take time and require a number of new solutions tailored to the principle of the fishery being fully accountable for the effects on stocks and the ecosystem. It is crucial, that the development takes place in respect of the overarching principles as well as local circumstances and industry interests. The Foresight must contribute to knowledge regarding.

- Sociology – that is human endeavour and how it is affected by public management, market requirements and societal and economic incentives.
- Economic models assessing effects of alternative management approaches to wealth generation
- Distributional effects
  The CFP gives priority to societal developments such as small-scale fisheries and coastal communities. The Foresight should assess
- Trends in coastal community developments as a consequence of CFP policy choices.
- Opportunities for recreational fisheries.

Economy and barriers

The global development of sustainable fisheries should be based on a level playing field principle. Global sustainability and competition is affected by disparity on sustainability standards, access to IUU fish and false labeling. The foresight should reveal developments in the fields of control and market developments related to this.

Maritime policy consequences

The global pressure on space and natural resources calls for a maritime strategy. DG Mare has taken lead of this. Fisheries are often considered as the residual factor when operator at sea need more space. The foresight should consider trends and scenarios with effect on food supply and the growth perspective for fisheries and aquaculture in competition with other uses of the services provided by marine areas.

Discussion on scenarios and strategies for policy development

The CFP development since 1983 has been driven by the need of gaining control of the situation. That need is still there. However the reformed CFP open an opportunity for a policy driven by the objective of optimised economic performance. Of meeting the future on own terms. The Foresight should offer scenarios and strategies with a view to qualifying the policy development in this respect.