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Operational evaluation tools
for fisheries management options

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Fisheries Management Evaluation Frameworks in Action

Conference Report

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The EFIMAS Conference

The **Fisheries Management Evaluation Frameworks in Action** conference took place in Brussels on 11-12 March 2008 as a celebrative finale to the Operational Evaluation Tools for Fisheries Management Options (EFIMAS) Project. The conference attracted 45 participants from many different parts of the European fisheries community.

What follows is a report of that conference in three parts.

Part One: The Idea

Part One contains three short articles. The first describes the overall EFIMAS project. The second is a brief introduction to the idea of participatory modelling, which is a general notion of how fisheries and marine management might be improved to which EFIMAS hopes to contribute. The short article third describes the Fisheries Library in R. This is the bio-economic modelling framework which EFIMAS has played a major role in developing.

Part Two: The Reactions

Part Two summarizes a series of discussions among participants that took place during the conference. Participants divided into seven small groups and spent an hour talking about their reactions to the conference while one of them took notes. These notes were subsequently collated and edited into short discussions of four themes: adaptive management; scientific integration; the importance of socio-economic information: and results-based management.

Part Three: The Concrete Experiences

Parts Three through Five contains short summaries of the presentations made at the conference. Part three reports on concrete experiences with using models developed in EFIMAS. Most of these involve making plans for specific species. But in two cases broader management strategies are evaluated.

Part Four: The Current Challenges

Part Four focuses on current challenges within EU fisheries management. These presentations come from one scientists working in DG MARE and another who has been active in modelling issues around managing mixed fisheries.

Part Five: The Stakeholder Responses

Part Five contains responses to the project from several stakeholder groups who attended the conference. One is from DG MARE. Two others are from the commercial harvesting sector, while recreational anglers and conservationist were represented by one speaker each.

Part One: The Idea

1. *The EFIMAS Idea*

J. Rasmus Nielsen

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EFIMAS Project Coordinator

European fisheries are under pressure at the moment. Not only are many commercially important fish stocks declining, so are the number of fishing boats and people employed within the fishing industry. At the same time, the management and regulation of the fisheries becomes more complicated every year. Stakeholder confidence in existing assessment and management models has been shaken, since these models currently only consider the effects of fishing on single fish stocks and the ecosystem, and do not take into account the social and economic impacts of fisheries management decisions as well as mixed fisheries and long term management strategy evaluation.

To facilitate the development of better fisheries management regimes, a European research project, EFIMAS, was launched to develop and integrate a set of new tools into a robust framework within which to simulate and evaluate the biological, social and economical consequences of a range of fishery management options and objectives within different management regimes.

The project involves cooperation between 30 research institutions from all over Europe covering the disciplines of fisheries biology, economy and sociology, and is coordinated by the Technical University of Denmark, National Institute for Aquatic Resources.

One of the major challenges is to ensure that the best possible knowledge is synthesised and made available to decisionmakers. To this extent, some of the project participants have reviewed the state-of-the-art knowledge base for fisheries systems and consequently published this in a book, "The Knowledge Base for Fisheries Management", which is available from Elsevier. Such information provides the background to draw conclusions of what is needed to improve fisheries management.

The tools that are being developed take account of the dynamics in the fisheries systems (including fleet and mixed fisheries interactions and fisheries behaviour) as well as effects of using e.g. alternative stock and fishery assessment models, economic based fishery models, and also considers uncertainties in the dynamics and in the data collection, assessment, modelling, advisory and management processes.

The framework and simulation models are tested in selected case studies covering different types of EU fisheries in different areas: North Sea mixed roundfish and flatfish fisheries, North East Atlantic mixed Nephrops and mixed Northern hake fisheries, Mediterranean Swordfish and mixed hake fisheries, and Baltic Sea Salmon and cod fisheries.

An overview of the simulation module of EFIMAS is given in the conceptual box flow diagrams on the back. The input data to module are generated by a descriptive model (operating model), which is assumed to represent the "true/real" system. The input data are then processed by a traditional or an alternative fish stock or fisheries assessment model (knowledge production model), which is used to generate management advice. By simulating the effect that the resulting management actions would have on the "true/real" system it is possible to generate a range of performance measures, covering the resource as well as the fishery (such as minimum mesh size, minimum landing size, closed areas, closed seasons and effort regulations). These performance measures will then enable the comparison of a range of management options under alternative management systems and objectives. In the same way that a pilot might fly in a simulator before flying for real, the simulation tool evaluates the robustness of alternative management strategies and options to give more holistic management advice before implementation.

The evaluation framework established through EFIMAS and its sister projects is an open source simulation tools and is made available from http://www.efimas.org and http://flrproject.org/. The evaluation framework has been used in ICES http://www.ices.dk stock assessment and mixed fisheries working groups, in the EU Scientific, Technical, and Economic Committee for Fisheries http://europa.eu/scadplus/leg/en/cha/c11127.htm working groups and in the Regional Advisory Councils, the Northwest Atlantic Fisheries Organization http://www.nafo.int and the International Whaling Commission http;//www.iwcoffice.org and presented through a long row of scientific papers, conferences, courses and workshops. By incorporating a wider range of variables and their uncertainty to illuminate the decision process and allowing for stakeholder feedback in the evaluation process, fisheries management will be made more accessible to all kinds of stakeholders.

2. Participatory Modelling

Douglas Clyde Wilson

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The classical role of science in decision making is that science provides objective knowledge that then becomes the basis of the political negotiations that result in the decisions. Under conditions of high stakes and high uncertainty the classical role of science is undermined as stakeholders use the political flexibility that uncertainty creates. This then expands into numerous problems with scientists undermine their own objectivity but building their own goals into their models, for example always making conservative judgement calls in keeping with the precautionary approach. Meanwhile, managers seek to turn more and more political problems into technical ones in order to avoid the costs of political negotiations.

One response to the problems that high stakes and high uncertainty creates is participatory modelling. A good example is The New England Project which was carried out with modellers from the Massachusetts Institute of Technology and stakeholders concerned with the electrical power grid in the New England region of the United States. New England's power grid was suffering dozens of times more voltage and load reductions than ever before because of continual political paralysis over power generation policy The MIT scientists felt more knowledge was needed and their modelling skills could help. They met with a group of 20 stakeholders to discuss using models to find solutions. They developed modelling tools that analyzed scenarios, which they defined as a set of technical options and a related set of uncertainties. The requirements for the scenario modeling did not resemble any existing computer package so they developed a methodology in which impacts were measured using multiple criteria so that multiple objectives could be evaluated simultaneously. The selection and evaluation of scenarios were an interactive process and in the end a majority of stakeholders found that they preferred scientists as mediators. The New England Project continued for nearly 10 years and was, according to Clinton Andrews (2002) who documented the project "spectacularly effective in reorienting the stalled regional policy debate away from polarization around single options such as ’conservation only’ or ’nuclear only’, moving it toward considerations of multi-component strategies”. However, it never succeeded as a forum for direct negotiations on policy matters. No consensus documents emerged.

This experience and similar, less ambitious ones, both inside and outside of fisheries, have pointed up how scientists and modelling can play a facilitation role in science-based policy areas that are an important compliment to the classical role of science. Participatory modelling is not a substitute for science producing an objective basis for such things as precautionary limits on the exploitation of fish stocks. It has a separate and equally important role. Management strategies and scenarios within a participatory decision-making context can be evaluated using an explicit modelling framework that will help stakeholders to decide between possible. The framework itself can be improved as decision-makers and other interested parties can help scientists to choose the most useful simplifications of reality. Because the focus of the discussions is on crafting carefully coordinated strategies rather than horse-trading options into a lowest common denominator strategy, less time is spent battling over fundamental values. An important aspect of participatory modelling is that it forces stakeholders to clarify their objectives and explicitly address the trade-offs implied by various strategies. Most importantly, participatory modelling, as in The New England Project example allows the discussion of uncertainty to be at the centre of the decision making process by building the evaluation of uncertainties into the various scenarios.

Andrews, Clinton J. 2002. Humble Analysis: The Practice of Joint Fact Finding Westport CT: Praeger Publishers

3. *Building FLR*

Laurence Kell

Centre for Environment, Fisheries and Aquaculture Science

The management of fisheries increasingly embodies multiple and conflicting biological, ecological, economic, and social objectives. However, despite constant efforts to regulate fisheries by regional management bodies and national governments, fishing capacity often remains above that necessary to ensure the sustainable exploitation of marine resources, especially in developed countries. This failure has been analysed in depth during the past decade by the scientific community, which has repeatedly recommended substantial changes in incentives and governance, as well as adjustments in the way that fisheries research and monitoring are conducted and expertise is deployed. Although the need to develop alternative novel management strategies is widely recognized, it is almost impossible to develop these by conducting large-scale experiments on fish stocks. There has therefore been a trend towards the use of computer simulation to develop robust management strategies that can meet multiple objectives.

The FLR framework (Fisheries Library for R) is a development effort directed towards the evaluation of fisheries management strategies. The overall goal is to develop a common framework to facilitate collaboration within and across disciplines (e.g. biological, ecological, statistical, mathematical, economic, and social), and in particular to ensure that new modelling methods and software are more easily validated and evaluated, as well as becoming widely available once developed. In particular, the framework details how to implement and link a variety of fishery, biological, and economic software packages so that alternative management strategies and procedures can be evaluated for their robustness to uncertainty before implementation. The design of the framework, including the adoption of object-orientated programming, ensures that it can be extended to new processes and to new management approaches (e.g. ecosystem affects of fishing). Importantly the framework is open source to promote transparency and allowing technology transfer between disciplines and researchers.

A major challenge for fisheries science is to develop a framework for scientific advice that comprehensively accounts for key uncertainties and risks while supporting the sustainable exploitation of marine living resources and maintaining an economically viable fishing industry. An important principle when developing such a framework is robustness to uncertainty because, although it is seldom possible to predict the response of fish populations to management with any degree of accuracy, it is possible to assess which strategies will on average work best, i.e. which management option is more robust.

Scientists involved in stock assessment working groups are experiencing morale problems rooted in a feeling that too often all they are doing is “turning the crank” on assessments, and would prefer a greater scientific focus and combinations of reforms such as the development of management strategies that incorporate alternative measures, fleet-, fisheries-, and ecosystem-based approaches, and more interaction about advice with managers. FLR will hopefully help by providing tools for stock assessors, managers, and others for use in the advisory process, and allow strategic decisions to be made. For example, they should allow “what if” questions to be answered.

Using R and adopting an open-source license and development model, FLR is intended to improve transparency and scientific review, to encourage active participation, and to blur the distinction between developers and users by allowing participation in the development process. This is important: management of fisheries requires collaboration between disciplines, e.g. biological and economic, because if two policies have the same biological impact but different ones in economic terms, then an economic impact analysis can help derive a preferred option. For example, a reduction in fishing mortality implemented as an effort reduction may have the same biological effect regardless of whether it is implemented by limiting days at sea or reducing fleet size. However, the economic consequences and hence fishers’ response to these two alternative management measures would be very different. Notably, if such a policy makes a fleet bankrupt, then it is unlikely to get implemented in law or practice as a consequence respectively of political pressure or non-compliance.

Part Two: The Reactions

The following are collations of notes taken during the seven small group discussions. The points have been organized into four themes and rendered into a narrative form. We tried to be as faithful to the notes as possible and believe that all or at least nearly all of the recorded insights have been incorporated into one of the themes.

1. *An Adaptive Approach to Science and Management*

Fisheries management in Europe is moving away from management based on attempts at prediction in the direction of adaptive management. This has taken a long time to reach but the change process is accelerating. Proposals for revision of the Common Fisheries Policy move away from top-down micro-management

An adaptive approach will be information intensive. Adaptive management implies an ecosystem approach to fisheries management. DG MARE has begun to required full impact assessments for management plans and even changes in management plans. The complexity of the use and information of the tools is important. The data demands are extensive. It needs new thinking of how these tools should be most efficiently used and in which advisory and scientific bodies

The inverse of these benefits, however, is that the models we are developing in response to adaptive requirements are very data hungry. Complex tools in complex management systems trying to manage complex systems creates possibilities but should also be used with caution as it might be more beneficial to seek simplicity in some cases. People wondered if all the complexity was really necessary. A fear is that because there is so much complexity and possibly relevant information, we will end up approaching adaptive management in a way that is driven by the models. Instead of being tools they will constrain our options.

Adaptive institutions need to be “short and sweet” in decision making; they have to deal with complexity without becoming themselves too complex to function. One key this will be to move from a short-term reactive to a long-term strategic inclusive approach. Another will be investigation of the appropriateness of management methods other than TAC, such as effort management and technical measures, especially in cases that TACs are not applicable

2. *Tools for Integrated Science*

The EFIMAS project has taken us further down the road toward learning to evaluate the relative performance of alternative management options and objectives in scenario-evaluation is new which gives better possibility for performing reflective advice and management. FLR is both flexible and useful. It has been impressive both in scope and in its openness. The open source approach has been an especially important part of this openness.

The evaluation framework that has been developed, and the range of disciplines and aspects that have been included, cover most types of stakeholders sin the fishery system and most types of tools in the advice system. This has been developed outside of ICES in groups working independently. As such it provides possibilities for science to take a new role based on the inclusion of different disciplines and multi-disciplinary expertise in the production of fisheries advice.

One new priority is to establish a project identifying the best use of the established management evaluation framework and further development of it. Questions that need to be address include:

- Who should use these tools and how should they use them to support the advisory and management decision process?
- In which fora should they be used?
- How can the multi-disciplinary aspects (biological, economical, sociological) be best used and developed?
- How should the stakeholder input, involvement and feed-back in the use of the evaluation framework be assured?
- How can the products be extended to be used in other areas such as the Black Sea?

Scientific integration is a critical question for both further research initiatives and ongoing fisheries management institutions. We need to identify mechanisms to incorporate knowledge in a consequential and standardised way that includes integration, participation and built in feed-back. We should also be engaged in double-loop learning by analyzing the benefits of our own activities. For example we should place management strategy evaluations in wider context by examining the trade-offs between improved interaction and transaction costs.

Integration is required at several levels. One is the integration of research institutes on the European level in terms of data, sampling, and research. This would mean following up on Joint Research Centre work that is already started. Integration must be carried out over disciplines including both socio-economics and institutional sociology, and over national and international boundaries. The goal is to establish decision making approaches that rely, as much as possible on scientific advice while recognizing, as a matter of course, that science is multi-disciplinarily and that fisheries management is about managing human activity rather than biological populations.

3. The Importance on including Socioeconomic Information

A critical step forward has been the development of full feedback bio-economic models for management strategy evaluations. New demand for the type of analysis this makes possible is coming from the managers. DG MARE is emphasizing more the links between fisheries and environmental issues, socio-economic issues, as well as he wider environmental impacts of fishing. There is some concern, however, that the extent of the use of bio-economic models/economics, though in some cases it is only lip-service. I is important that we don't just bolt the economics on as an afterthought, but rather we should allow feedback so that the economics influences the biology as well as vice versa. Eventually, ICES needs to integrate social and economic issues into the advice with a two-step advice structure.

Taking socio-economic information seriously requires new research efforts. These include:

- The study of fishers' behaviour in response to management measures.
- The expansion of fishery sampling schemes to include social data.
- Starting with economic imperatives and then deciding what else to include.

4. Results Based Management

Results based management involves making management objectives, such as limits on fishing mortality or bycatch, clear to fishers and then allowing them to develop the strategies for achieving these results. It works on three levels, all of which require some modelling: i) setting community and ecosystem objectives; ii) finding ways to achieve the objectives; and, iii) auditing compliance. First the limits have to be set through a process involving managers and a wide range of stakeholder groups. Then scientists need to use models when aiding the fishers to develop the strategies. This means participatory developing further the methodologies for participatory modelling. Finally data must be gathered and analyzed in order to assure compliance.

The building of strategies can be facilitated by scenario modelling. Scenario evaluation allows that both the scientific perception of the world (e.g. perception of historical information) as well as the stakeholder perception of the world can be directly evaluated and compared with respect to different consequences and results in advice and management of the different perceptions. Stakeholder knowledge can be taken directly into account. The extent of stakeholder buy-in has been apparent from the participatory exercises presented at the meeting, albeit with the caveat that the buy-in may only apply to the industry leaders and not to the guys out on the boats.

A critical part of results-based management is setting the burden of proof. It is up to those who wish to carry out activities to demonstrate that they are operating within the set limits. Research is required for the development of approaches that allow incorporation of stakeholder knowledge in assessment procedures including real time data collection, observer coverage, remote sensing, VMS, information from the industry including the processing & retail sector. Economics cannot be treated as an add-on. The system must be simply enough so that the industry understands it and lines of responsibility are clear.

Decision making needs to take place through bodies that have integrated, participatory advice and management. This can be similar to the RAC but the concept would have to be expanded. This means involving different scientific disciplines as well as stakeholders. Much of this will need to be based on regional management approaches. The discussions will need to focus on strategies that develop rules rather than discussions over rules when they have to be carried out.

Part Three: The Concrete Experiences

1. *Management strategy evaluation for Greenland halibut*

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A decline in the NAFO 2J+3KLMNO Greenland halibut stock abundance led to NAFO Fisheries Council establishing a fifteen-year rebuilding plan in 2003. Certain specific (e.g. exploitable (5+) biomass target of 140 000t) and general (e.g. sustainable yield over the long term) targets were set but few details were given for how these goals were to be achieved. Initial TACs were specified for the first four years of the plan and Scientific Council was to monitor and review the progress of the rebuilding. The 2006 and 2007 stock assessments indicated that the stock is no nearer to achieving the goals set out under the rebuilding plan. In 2007 an exploratory look at an MSE for this stock using the FLR framework was presented to NAFO Scientific Council proposing this method be further developed and used as a means to design and test a robust management strategy capable of achieve the rebuilding plan goals. A study group was formed to consider a more comprehensive MSE analysis.

Primary work was done by DFO scientists with input from other members of the NAFO scientific council (Spain in particular). It was decided to involve the stakeholders at the building stage rather than present them with the finished product. Hence, resource managers and industry representatives from Canada, Spain, Portugal and Japan were invited to provide input in the formulation of the MSE. This was done in order to ensure transparency in the process and agreeable harvest control rules (HCRs) and targets.

The study group looked at an initial reference set of operating models (OMs) falling into three classes: Current View (based on the latest assessment); More Optimistic View (included dummy indices to create a healthier starting stock); and Less Optimistic View (based on the hypotheses that the current condition of the stock is further away from MSY than current calculations indicate). Operating models were distinguished by stock recruit relationships, natural mortality rate (*M*), rate of decline in commercial selectivity for 14+ fish and the indices used in setting up the initial populations (optimistic vs. current). A number of exploratory Management Strategies (MSs), both model-free and model-based, were looked at. Model-free strategies included fixed TAC (no feedback) or index-based HCRs (e.g. $TAC_y = TAC_{y-1}(1+\lambda*\text{slope})$, where slope is the change in abundance indicated by indices over some period of time). Model-based strategies involved applying HCRs to the results from an XSA carried out each year. Each MS was applied to each OM under three levels of error: Deterministic (no error), "P" (process) error only ('perfect' data from 'True Pop.') and "PO" (process-observation) error (based on indices generated using Observation error) or "POM" (process-observation-model) error (numbers at age data are determined from a model assessment). The results under each MS were compared on how they performed across a suite of performance statistics both fishery- and stock-related.

While the MSs investigated were generally acceptable, some modifications need to be explored. Industry representatives stressed that stability in TACs is important and annual adjustments should be restricted. The main area of concern was the construction of OMs.

Concerned parties emphasized the importance of well conditioned operating models that cover a broad range of perceptions of the current and past status of the stock.

This would involve considering alternative assessment models that cover a range of perceptions, alternative stock structures and stock-recruit relationships. Industry representatives also felt that Scientific Council should examine whether a useable index of abundance can be derived from commercial catch rate data. Agreeing upon an acceptable representative reference set of OMs is fundamental in encouraging buy-in to the whole process. Data produced from MSE can be overwhelming and it is important that performance statistics are clear, descriptive and understandable for all parties involved. A useful suite of performance measures was established to adequately compare MSs and will be used to evaluate all MSs in future analyses.

This initial stakeholder involvement was partially successful – it involved representatives of NAFO member countries, but not First Nations and ENGO's who also have an interest. However, the Study Group format (Scientists, managers, industry) worked well and feedback from industry representatives, many of whom had no previous experience with the MSE approach, was generally positive. The invited independent experts played a valuable role in discussions. All parties were pleased with the collaborative approach and were encouraged by the initial steps. The Study Group recommended that the process should be continued, but only if appropriate expertise is available. The work on Greenland halibut MSE could be regarded as a 3-year project, currently at the end of year 1.

FLR proved to be a very useful platform to work with. Initial work was done using v 1.4 and later parts of v 1.99 were used as v 2 came nearer to completion. Changing between versions posed a few problems and these libraries should be more useful once the stable version has been established. It was found that expertise in coding was not essential (none of the scientist working on the project had extensive prior experience in R) and hence FLR is a fairly accessible method. However, work would progress easier and quicker if the main developer is embedded in an institution with a critical mass of expertise.

2. Baltic Close Areas

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Ensuring the efficiency of regulations for Baltic Cod required testing some important assumptions about the relationship between where and how much people fished and how the Baltic Cod stock would change as a result. To achieve this, the behaviour of the fishers needed to be integrated into the exercise. We needed to understand how fleet behaviour would change across both time and space in response to both how the fish moved and the implementation of regulations involving area- and season-based restrictions. A simulation frame was developed in R using the FLR open-source platform. The model we developed consists of three sub-models: (i) a multi-stock module that considers how the populations of fish stocks in different areas change; (ii) a multi-fleet module taking into account of the heterogeneity of the fishing practices; and, (iii) a management module that could examine both conventional management techniques and permanent or temporary closed areas and seasons. All these components operate on a spatial grid matching underlying data in monthly and spatially dis-aggregated observations. We used log-book data to assess fishing patterns and developed some equations suggesting how fishing patterns might change in response to either management measures or fluctuations in the fish stocks. Finally, we added an economic description of the fishery to the model. We are able to consider how economic conditions might have an impact on the displacement of fishing effort, changes in fishing activities or vessel capacity. We used this model to test various scenarios for the Baltic Cod fishery. These included two different ways to design the operating model, two different scenarios of environmental impacts, and three different management strategies. The simulated management regimes we evaluated included TAC management, with among other a one-year time lag TAC, compared to effort management in the form of direct effort control as well as indirect effort control through closed areas and seasons (as suggested by DG MARE) Also the "F-adaptive approach" suggested and implemented by EU and considered in the ICES Baltic Fisheries Assessment Working Group for the recovery of the Baltic Cod was tested as well as The different environmental scenarios cover situations of favourable conditions for cod-recruitment in connection with a larger inflow of Atlantic seawater into the Baltic Sea compared with low-inflow situations followed by relatively low recruitment. We finally examined different assumptions about how fishers might behave in response.

3. *Mediterranean swordfish*

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Markos Foundoulakis

Hellenic Catching Sector

George Panaglotakis

Hellenic local manager

The objective of the study was to evaluate the biological and economic implications of different management measures concerning the Mediterranean swordfish stock. Based on past discussions in the scientific groups of the International Commission for the Conservation of Atlantic Tunas (ICCAT), the study focused on different temporal closures aiming to protect juvenile fish. Medium term predictions on the levels of landings, spawning stock biomass, gross and net revenue were obtained by means of simulations performed under the FLR framework. Results indicated that landings, spawning stock biomass, gross and net revenue were increasing with the increase of the duration of the fishery closure with the response of the spawning stock biomass and net revenue being always more profound. Final scenario development was made in collaboration with stakeholder groups (mainly fishermen and local managers), through an interactive process.

Stakeholders have pointed out the importance of developing management scenarios through participatory approaches which, apart from biological knowledge take into account empirical knowledge and socio-economic parameters. The enforcement of management measures that have been developed through participatory approaches is much easier and such approaches should be adopted on a regular basis. Regarding the management scenarios evaluated in the current study they considered that a 4-month fishery closure would be an acceptable measure in terms of cost/benefit. Future work should attempt to assess the effects of closed areas (Marine Protected Areas), provided that essential fish habitats for swordfish have been identified by means of biological studies.

4. Northern Hake Long Term Management Plans

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In the late 1990s, due to the concerns about the low level of the stock biomass of the Northern Hake stock and the possibility of recruitment failure, a range of technical measures were introduced (Council Regulations N°1162/2001, 2602/2001 and 494/2002) aimed at improving the selection pattern and protecting hake juveniles.

Subsequently a recovery plan was introduced (Council regulation EC Reg. No 811/2004). The recovery plan consists of setting a TAC equivalent to a target F of 0.25 (Fpa), or a lower F to prevent decline in SSB, and with the constraint that annual change in TAC should not exceed 15%. The recovery plan was foreseen to be replaced by a management plan when, in two consecutive years, the target level for the concerned stock has been reached, in accordance with Article 6 of EC Reg. No 2371/2002.

Under this Northern Hake stock status, EFIMAS project was planned and developed. The aim was to provide managers and stakeholders with a better idea of the consequences of the announced long term management plan before opting for a particular management approach. With this in mind, a set of new tools to simulate and evaluate the biological and economic consequences of a long term management plan under different targets and strategies was developed.

The result has been a very useful framework to evaluate, in the long term, robustness of the management strategy to the biological (growth, abundances…) and economical uncertainties of the Northern Hake Stock. This has been proved in ICES Assessment Working Groups and in the work developed by STECF during 2007. Validation by final users has been also carried out by means of presenting the Case study to related Regional Advisory Committees (RAC) and finally, in March 2008, at the EFIMAS Conference in Brussels.

5. Management strategy evaluation for North Sea haddock

Coby Needle

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North Sea haddock (*Melanogrammus aeglefinus*) are managed under a plan agreed between the European Union (EU) and Norway in 1999. This presentation traced the progress of the management plan, from implementation in 2005, review and revision in 2006, and subsequent further review in 2007. The management strategy evaluations on which the reviews were based were implemented in the R programming system, using FLR libraries developed under EFIMAS, and used stochastic simulations of the complete fishery system (including a biological operating model, a knowledge production model with “live” stock assessments, and a simple implementation model). The presentation considered in detail the elements of this system thought to be particularly relevant for the understanding of the North Sea haddock fishery, including recruitment, discards, and the sliding-F exploitation rule.

The results of the most recent review were summarised. It is clear from these that the behaviour of fishing fleets in different situations in poorly understood, and also that this behaviour is crucial to the success (or otherwise) of any management plan. The particular issue for North Sea haddock appears to be the modelling of discarding at sea. Lacking an alternative, I have assumed a constant proportion discarded at age, but this has deleterious effects on the virtual assessment within the simulation loop. When a large year-class appears in the fishery, this would normally be heavily discarded because the quotas cannot increase quickly enough to reflect the population (due to restrictions on interannual change). With the constant discard proportion model, this does not happen, and the virtual assessment is presented with less fish than there actually are. The result is an assessment of abundance that is biased downwards, and management that is more conservative than necessary.

The presentation concluded by suggesting that simplified scenarios may ultimately have the potential to be more informative than attempts at faithful representations of real multidimensional systems. The single-species, single-vessel lake model was proposed as a possible starting point for this approach.

6. North Sea flatfish case study: results and processes

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Management plans are being developed for many fisheries. The North Sea Plaice stock has been below the precautionary reference point and required action. In 2004 there were initiatives to develop a management plan for plaice. That created a need for tools to assess and communicate the trade-offs between different management options The North Sea flatfish case has been used to assemble those tools and to bridge the gaps between managers, stakeholders and scientists.

During the flatfish case study we developed three types of models: (1) spatial models for plaice management which were used by the NSRAC in formulating their advice in 2005, (2) Mixed fishery models to evaluated the flatfish management plan proposed by the EC and (3) Bio-economic impact assessments for plaice and sole. These evaluations have bridged the gaps between science and stakeholders and managers and between scientific disciplines. The close interaction between science and managers has been on interpreting the contents of management plan. The interaction with the stakeholders has been on including different management options, e.g. through specific “stakeholder scenarios” of effort allocation. The case study has contributed to the integration of biological and economic disciplines through the dissemination and linking of fishery and economic simulation models.

The case study has highlighted that there are temporal and spatial constraints to level of detail in modelling. Although it is theoretically possible to model any level of detail with the tools available, the interpretation and communication of the results could become difficult in a management context. We also concluded that in most cases there appear to be elements in management plans that are non-prescriptive and that these can only be addressed by evaluating different interpretations of what those elements could mean. We conclude that the North Sea flatfish case has been successful in bridge the gap between different user groups and has provided practical tools to evaluate management options and to inform the management process.

Part Four: The Current Challenges

1. *Mixed Fisheries Management*

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Stuart Reeves

Centre for Environment, Fisheries and Aquaculture Science

Fishery management advice has traditionally been given on a stock-by-stock basis. Recent problems in implementing this advice, particularly for the mixed demersal fisheries of the North Sea, have highlighted the limitations of the approach. When a TAC for one species caught in a mixed fishery is exhausted, vessels will often continue to fish for other species that are caught in the same fisheries for which they still have quota available. As a result the first species is still caught and the TAC does not have the intended affect of limiting fishing mortality. We here describe an approach to giving management advice on mixed fisheries that uses information on fishing fleets and their activity to quantify the extent to which different species are caught together and to permit the development of management advice that accounts for such mixed fishery effects.

The initial spur for work in this area came in about 2000 when the North Sea cod stock had fallen to such a low level that the scientific advice was for a zero catch of cod. At the same time the North Sea haddock stock was relatively healthy. To a large extent the two species are caught together in the same fisheries. Since then, a cod recovery plan has been introduced, but it has not been as effective as anticipated. To look at the effect that the technical interaction between cod and haddock may have had on this, we have developed and run simulations using the FLR toolbox. The idea behind these simulations is that under the cod recovery plan, the annual TACs for the cod stock are set low relative to the abundance of the stock, with the intentions of restricting fishing mortality. At the same time, the healthy state of the haddock stock means that the TACs for that stock are set at a higher level relative to the stock abundance, and are thus much less restrictive. By using information on the quota shares of each fleet for the relevant species, as well as the past relationships between catch and effort, it is possible to translate each TAC into the relative effort it implies for each fleet. This leads to two scenarios about future effort; in each year fleets could either stop fishing when they have exhausted their most restrictive quota (cod), or they could continue fishing until they have exhausted their least restrictive quota (haddock), and thus overshoot the cod quota. These are termed the ‘min-effort’ and ‘max-effort’ scenarios. The projections used data from 11 fleets and assumed that TACs were set according to the default ICES harvest control rule.

The results from the projections indicated that under the ‘min-effort’ scenario, the cod stock recovers, the haddock stock stays at a high level and the stock assessment performs well, showing a close correspondence between the perceived and simulated populations. In contrast, under the ‘max-effort’ scenario the cod stock does not recover, the haddock stock declines and there is a large deviation between the low fishing mortality on cod apparent from the stock assessment and the true, high fishing mortality. This latter effect comes from the over-quota catches of cod which are not available to be included in the assessment.

The ideas behind the cod and haddock simulations summarised above have been used in an approach called Fcube which has been developed as a way of providing fisheries management advice that can account for such mixed fishery effects. This approach was first developed by the ICES Study Group on Mixed-fishery Management, and is being further developed by the EU FP6 Project 'Aframe'. Fcube can be used to derive sets of TACs which imply a consistent level of effort for each fleet, or to illustrate the extent of the mismatch between a proposed set of single-species TACs. However, the approach is data-demanding and the quality of such predictions is limited by the quality of the assessments underlying the single-species advice.

Perhaps the greatest strength of the approach is its recognition that the response of a fleet to exhausting a TAC is not necessarily to stop fishing, but that a wide range of other actions are also possible. The fleet response to management is an important factor in determining the success of any management measure, and one which is generally overlooked. Recent trends in European fisheries management imply a move away from predictive TACs as the main management tool, towards the use of a wider range of tools in a more adaptive manner. In such a context, the inclusion of information on fleets, their activity and their response to management will be essential to the advisory process, and tools like Fcube will be an important part of this.

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2. *Future EU advice needs*

Poul Degnbol

DG MARE

The needs for future advice can be derived from the changes in policy directions which are taking place and new implementation modalities which may emerge, especially in relation to the next reform of the CFP.

The policy changes include change from tactical to strategic approach (tactical decisions to be based on principles – long term management plans), from avoiding disaster to doing something good (from PA as target to PA as boundary + MSY), from predictive to adaptive management (complexity and robustness to uncertainty) and integration of interactions with ecosystem and other sectors, mainly through the Marine Strategy.

The implementation changes may include more emphasis on effort management, spatial management – integrated w other sectors – in the marine domain and a different approach to technical measures in a results-based framework.

A condition for this and for better performance of the CFP would be institutional changes including clearer objectives and a clear hierarchy in decision making and implementation, to results based management including a change from top-down micromanagement to industry initiative within limits. This may involve some elements of reversal of the burden of proof.

Results based management poses important new questions to research. How can one define maximum acceptable impact – both from a technical point of view and in terms of societal values.

A reversal of the burden of proof would men entirely new roles of scientific advice – to support industry in proposing means to fulfil requirements and to assist public audit of industry performance.

All these changes will point to richer interactions between science and other stakeholders implying a change to an exploratory and interactive delivery where the trade off between various options are explored.

EFIMAS has contributed importantly to development of the tools needed to support policy within such new frameworks and delivery mechanisms. It is the first major attempt in Europe to develop tools for exploratory and interactive delivery integrating all aspects of the issue. There are some concerns which need to be addressed in future development of the framework such as the transaction costs, the transparency to stakeholders (including Commission and MS) and the integration of environmental issues.

Part Five: The Stakeholder Responses

1. *The EFIMAS Focus Groups*

Ditte Degnbol

Innovative Fisheries Management, an Alborg University Research Centre

Modelling is an ever more widespread tool in science informing policies. Models hold a number of potentials as participatory tools. But they also add new kinds of difficulties to the relation between science and stakeholders. As part of the process of developing the FLR modelling framework, the EFIMAS focus group interviews were an attempt to identify some of the challenges we face in fisheries science and management for what concerns the science-stakeholder relation. This presentation is a summary of the findings.

A set of focus group interviews were performed in 5 countries: UK, Denmark, Ireland, Spain, Greece. For each case five different stakeholder groups were represented in focus groups – that is, the catching sector, onshore sector, women in fisheries, local managers and environmentalists. In a few cases individual scientists were interviewed. The interviews were structured around 5 themes that also structure this presentation: Science in general, fisheries science, fisheries science in management, modelling in general and the particular FLR modelling framework.

Important to note, the following is not an expression of a shared consensus among all the stakeholders, but a mixed pile of statements. I will, though, focus particularly on the most widespread perceptions.

Science in general. One thing that was common for most focus groups was that they weren't really vocal on the issue. Answers were brief, and the topic was quickly diverted into fisheries science. Participants in the environmentalists' groups were most engaged in the issue – this is hardly surprising as most members of these groups were trained natural scientists. This characterised their statements throughout the interviews.

Fisheries science. When the discussion moved on to address fisheries science, participants generally felt more comfortable about the issue, had strong opinions and participated on an often rather well-informed level, drawing on multiple examples to illustrate their points. This is probably due to most participants having extensive experience with fisheries science from different positions in the field. And, when it comes to fisheries dependent stakeholders, fisheries science often has a direct impact on their livelihoods.

The main perception in most focus groups was that to be good fisheries science, it must be objective and, as a precondition for this, independent. Independence was generally understood as not being funded by groups or institutions with particular interests in the research outcomes. Another perception was that fisheries science must be modest – that is, scientists must be able to accept their mistakes and not take themselves too seriously. Finally, according to participants in most stakeholder groups good fisheries science involves fishers.

Most participants – however least the environmentalists – displayed considerable scepticism towards fisheries science. These discussions evolved around three main issues, namely technical failures of science, political and personal bias and scientists' attitudes:

1. For what concerns the technical failures of fisheries science, some stated that due to the complex and dynamic nature of the object of study and due to scientists depending on data

from fishermen, uncertainty is a precondition for fisheries science. Some participants were concerned about fisheries scientists often letting out important variables like water temperature or important species or not taking seasonality or the dynamic sea into account. Finally, some argued that scientists use wrong gears when taking samples or do their samplings in the wrong places.

2. There was widespread concern that fisheries science is informed by political agendas and personal interests. This concern was most outspoken in the fisheries dependent and managers' groups. The main argument was that science is informed by the interests of those who fund the research. Stakeholder-funded research received the most scepticism as it was believed to be informed by the stakeholders' interests in the outcomes. Government-funded and ICES research received the most confidence, but was still argued to inform research through funding priorities and scientists conforming to government agendas in order to keep their job or fundings.

3. A final core concern, particularly among fisheries dependent focus groups and some managers' groups, was scientists' attitudes. The main argument was that scientists are theoretical and lack knowledge about what happens on the ground. Hence, it was argued among many participants, scientists need to learn from fishers. It was also a general perception that scientists are not interested in fishers' inputs and often think they are infallible. This was perceived to be a problem for the validity of the research, and for the legitimacy of the research among fishers.

Fishers' involvement in fisheries science was a returning issue and presented as a response to many of the concerns above. It was mainly advocated in the fisheries dependent and managers' groups, but also environmentalists argued for fishers' involvement, for example by arguing that ecosystem based management must take the whole ecosystem into account, including the fishers and their livelihoods. Four basic arguments underpinned the claim:

- Fishers' involvement in the research process will ensure a more accurate knowledge base for management.
- Fishers' involvement in the research process will ensure a fisheries management that is more efficient and backed up by fishers.
- Government science is informed by political agendas. Fishers might not be objective either, but their representation in science will ensure a more democratic and just knowledge base for management.
- Fisheries research tends to draw mainly on environmental data. There is a need to take social and economic dimensions into account.

Science in management. A common perception was that fisheries management must be backed up by sound science. For environmentalists the argument was about ensuring that fisheries management is ecologically sound. For fisheries dependent participants it was about ensuring that management measures with drastic consequences for livelihoods are only enforced when there is sound scientific support for its necessity.

Modelling in general. Many participants had no experience with models, and some participants even felt uncomfortable about the issue. The environmentalists were most vocal about it - again, this is probably due to most of them being trained natural scientists. As with fisheries science, there were many concerns about models. According to some participants the success of a model depends on the quality of two kinds of input, namely the basic assumptions it is based upon and the data fed into it. Models were by some argued to be theoretical desk-work that does not allow for inputs like the intuitive and experience-based knowledge of fishers. Models were also argued to be ascribed too much authority and to lack transparency. Finally models were argued to seem convincing and hence used to sell unpopular initiatives. Participants recommended not to take models too seriously and to supplement them with other kinds of data.

The FLR modelling framework. When presented to the FLR framework, few commented on it except from asking questions and suggesting scenarios to simulate. This is probably due to FLR being complicated and difficult to access. The framework particularly received positive evaluations for its attempt to integrate environmental, social and economic factors. Environmentalist participants argued that it would be a potential tool for implementing the ecosystem approach. Some argued that it could provide a standardised basis for management.

Main recommendations were to involve stakeholders from the very start, make the model more simple, eventually by building it for particular purposes and leaving out the parameters that are not relevant, and to mediate the outputs in intelligible ways to the different audiences.

To conclude, most participants were very sceptical about fisheries science and the use of models – however, many were slightly positive about the FLR modelling framework. A core recommendation in the further development and use of models in fisheries science was to involve fishers at all stages of the process.

2. Response from DG MARE

Jacques Fuchs

DG MARE

EFIMAS has been a success in developing new tools to simulate and explore scenarios for different fisheries management options taken biological, environmental and economic factors into consideration.

These tools are open source and public domain, which has been crucial for the Commission as a condition for moving into a new era where models (biological and economic) are developed in an accumulative, incremental mode rather than new models being developed from scratch for each new issue as has been the tendency in the past;

EFIMAS has also investigated new advice delivery mechanisms where such tools are used in an exploratory process which is inclusive of stakeholders; the Commission considers this important in a world where objectives are multidimensional, predictability is limited and solutions must be based on comparative evaluations of outcomes of a range of options;

Several applications of the FLR framework have already been tested with success including by STECF such as management strategy evaluation for hake long term management plans, North Sea Haddock;

The EFIMAS project has as many other research projects a communication problem. The tools cannot be applied and results not interpreted without considerable expertise and the application must therefore be in cooperation between researchers and stakeholders including the precautions necessary for interpretation and full transparency about the premises for exploratory simulations. The proposed toolbox cannot be applied without precautions;

Efforts should be made to communicate results in a much simpler way (as simple as possible but not simpler). The results should also include risk evaluation for example for stock collapse and ecosystem impacts and could be presented with uncertainties in a traffic light system;

Links with other complementary RTD projects e.g. COMMIT, FISHBOAT should be established to add value to the results;

The way forward should include a reflexion on:

- Transaction cost for maintaining the system in place including both the public domain software and the delivery mechanisms when it is used for advice;
- Applicability on concrete new cases (new recovery plans);
- Further development of stakeholder involvement in exploratory advice delivery. This could take place through some pilot work in relation to specific management plans;
- Gaps in research with a particular attention given to the integration of environmental requirements into the system.

In conclusion, the result from this project will without doubt be used and have already been used by bodies like STECF and ICES. A detailed evaluation of the results (including the Policy Implementation Plan) will have to be done before any new projects can be financed.

3. *Response on behalf of EAA and EFTTA*

Jan Kappel

The European Anglers Alliance (EAA) and the European Fishing Tackle Trade Association (EFTTA)

The EFIMAS team has done a very fine job in developing a set of new tools that can simulate and evaluate both the biological, social and economical consequences of a range of fishery management options and objectives. The cases presented where this 'machinery' had been in use were convincing. European fisheries management is becoming ever more complex not the least due to the eco-system based approach to fisheries management as required by the reformed Common Fisheries Policy of 2002[1] and the new data regulation of February this year[2].

Tools like these provided by EFIMAS are really needed and very welcomed by all involved with fisheries management. No simulation model can be better than the data available allows it to be. On this point we have some remarks:

Our sector ‘recreational angling’ is per definition part of the broader sector ‘recreational fishing/fisheries[3]’ (also named ‘non-commercial fisheries’ in some EU legislation). It is clear that EFIMAS has not dealt much with recreational fishing when developing their simulation tools. Nevertheless, it seems that the tools can deal with recreational fishing as well but data is lacking nationally and at the EU level. In particular socio-economic data is lacking.

There are some 8-10 million sea anglers in Europe. The socio-economic value of this sector is estimated 8-10 billion euro. The EFIMAS conference acknowledged that there is a need to include recreational fishing data in the model with regards to European fisheries management.

ICES announced that in January next year they’ll arrange a Workshop on Sampling Methods for Recreational Fisheries to “Provide a comprehensive description of the marine recreational fisheries in each EU country including the species/stocks targeted, the potential or known magnitude of recreational catches and effort by geographic area, time period and fishing method and the definition of appropriate reference populations of recreational fishermen for sampling.”

This ICES initiative is very welcomed. Still we are concerned that focus is mainly on our sector's catches and less interest and efforts are offered the socioeconomic data needed for fisheries management. We urge the EU Commission and ICES to provide all data, incl. socio-economics, needed for a proper output when using the EFIMAS or other fisheries management simulation tools.

4. *Response from Greenpeace*

Hanne Kærgaard Lyng Winter

Greenpeace Denmark

It is good to see tools like this used in a constructive and qualified way, given the possibility to look at the outcome of different scenarios. Also the cooperation between stakeholders and scientist are positive, and, in my opinion necessary when talking about a complex subject and problem as fisheries management. That said I think there tend to be a stakeholder bias in applying the models. This could be why a range of the scenarios presented reflect much of the current management schemes, and not taking for instance environmental aspects into (enough) account.

Greenpeace feels that environmental issues need to become an integrated part of fisheries management, meaning that, among others, we would like to see scenarios where large part of the ocean are protected permanently for fishing. This sort of management schemes have not been presented, and could perhaps be due to the fact that stakeholders are primarily industry.

5. *Response from the Scottish White Fish Producers Association*

Mike Park

Scottish White Fish Producers Association

The Scottish catching sector has changed over recent times especially in relation to their appreciation of a more 'forward looking' approach to fisheries management. The three main components of that change are: A more sophisticated approach to the biological output with regards to the information that is supplied by ICES and the way that output is modelled for management purposes, the social response to change and how that effects the delivery of specific management plans; the most important for the fishers is of course the economics of the business and how best they can secure and sustain both relative and absolute success.

With specific reference to the management strategy evaluation for North Sea haddock by Coby Needle of Fisheries Research Services (FRS) in Scotland, it was hugely important that industry acceptance was sought and cultivated if legitimacy for its output was to be acclaimed; the North Sea haddock fishery is extremely important to Scotland, landing over 90% of the UK allocation, which in turn is 84% of Europe's share of the North Sea TAC. The setting of the TAC is dependent on the output of bi-lateral negotiations with Norway and ratification of that agreement at the Council of Ministers, a wholly unprincipled situation at times. A more formal management plan for North Sea Haddock was due to be introduced quite soon so it was necessary to create a tool capable of evaluating the medium to long term effects of the plan, both in terms of stock stability and resulting TAC's .

Scenario planning, albeit with a certain degree of accuracy, is a pre-requisite for the success of most sectors of industry, fishing is no different. This requires the assistance of planning tools or modelling capabilities, Coby's model created just that. The concept of the model was discussed with industry at various events with the output demonstrated as a sliding scale of risk, a very useful albeit simplistic way to demonstrate its capabilities. The finer workings of the tool seemed rather more complicated to understand although on reflection there was no need for us to even try to understand; we were at ease with the peer review process.

The projections or more appropriately the scenarios provided by Coby gave the catching sector a degree of confidence, especially as it entered into a new phase in its development, a long term management plan with Norway.

We do have some concerns in relation to the capabilities of models such as this, and to what degree the managers should rely on them in the short term. As one industry representative stated "is this just another oppressive tool of an already authoritarian management regime". I don't subscribe to this position however, I do believe that we have to walk for a while thus creating an adequate timeframe to assess their capabilities. The work carried out by Coby has been extremely worthwhile giving us the ability to test the effects of extensions to the current situation, issues such as banking an borrowing and greater selectivity measures. In summary the tool is an extremely useful step forward in managing fisheries with a degree of confidence.

6. *Stakeholder Reflection on EFIMAS*

Nathalie Steins

Dutch Fish Products Board

Stakeholder's participation in modeling can be met by including stakeholders at the various stages of the modeling process; the very objectives and assumptions that lie behind should be evaluated a priori by the stakeholders and so should the data entry and the final outcome. Fishermen's stock perceptions should be included and the models must also address their information needs. The models should allow for stakeholder buy-in.

The models ought to pay attention to the economic component of management. Economic data can serve as an indicator for changing fleet behavior which on its turn may have potential effects on stocks. An alternative way to include social aspects of management is needed. Embedding economic data into models is also important to carry out sound cost-benefit analyses and/or impact assessment of management plans. This is something the industry considers to be really important.

There is a real risk of 'over complexity' related to modeling. Just like with fisheries regulations a 'health check' is needed. One must keep in mind the initial objectives and one must remember that modeling is a tool to look at alternatives or directions. The sociological tool of identifying 'critical incidents' may also be of use in deciding, together with stakeholders, on model parameters. This basically means that only those parameters which are considered to be of critical importance should be included.

Models are 'data hungry'. The Fisheries Library in R (FLR) – which has the properties of a Lego box - could help here as a platform to pool and access data. Data provided by the industry could also be seen as Lego blocks to fill the FLR toolbox. However, a range of constraints are set up by the scientific community. Scientists are very persistent about their data formats and what kind of information their models can and cannot cope with. Furthermore fishermen's data is often met with suspicion by the scientists who believe that industry data suffers from problems of objectivity and quality. We really need to find creative and alternative ways to make industry Lego blocks part of the management modeling toolbox. If not industry support for collecting data – such as discards self-sampling projects - will dwindle.

As a final free advice, the industry advises the scientists to check that they are talking about the same thing as the industry and that information is presented in an understandable way. For example, fishermen and scientists have different definitions of ‘catchability’ and plain language and graphs are easier to understand than formulas and tables.

Fisheries Management Evaluation Frameworks in Action

Conference Programme

11 - 12 March 2008

Renaissance Brussels Hotel
Rue du Parnasse 19
B - Brussels, 1050
Belgium
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In order to facilitate the development of better fisheries management approaches, the European Commission, in cooperation with 30 national research institutes, launched the 'EFIMAS' Project in 2004. The aim of EFIMAS was to develop a set of new tools to simulate scenarios based on various management decisions and evaluate their biological and economic consequences.

To meet this goal, the EFIMAS project has developed software tools and simulation models that make it possible for managers and stakeholders to compare and evaluate different approaches to fisheries management.

The EFIMAS project comes to an end in 2008 with the Fisheries Management Evaluation Frameworks in Action. At this conference, a wide range of stakeholders and scientists will report how they have used the EFIMAS scenario-based modelling approach to address practical fisheries management problems in the past years. They will share their experiences and lessons learned with an eye toward evaluating the EFIMAS experience and addressing future fisheries management challenges.

A detailed programme for the conference can be found on the following pages.

Conveners

Laurence Kell (CEFAS, UK)
Lorenzo Motos (AZTI, Spain)
J. Rasmus Nielsen (DTU Aqua, Denmark)
Clara Ulrich-Rescan (DTU Aqua, Denmark)
Martin Pastoors (IMARES, the Netherlands)
Per J. Sparre (DTU Aqua, Denmark)
Douglas C. Wilson (IFM-AAU, Denmark)

efimas
operational evaluation tools
for fisheries managent options

EFIMAS project website

www.efimas.org

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Fisheries Management Evaluation Frameworks in Action

The EFIMAS Conference

Programme

Day One – March 11th 2008

8:30 – 9:15	*Welcome coffee and registration*	
	Setting the Context	
9.30 – 9:40	Welcome	Lorenzo Motos, AZTI-Technalia
9:40 – 10:00	The EFIMAS Idea	J. Rasmus Nielsen, DTU Aqua
10:00 – 10:20	Participatory Modelling	Douglas C. Wilson, IFM
10:20 – 10:40	Building FLR	Laurence Kell, CEFAS
10:40 – 11:00	*Coffee Break*	
	Concrete Contributions	
11:00 – 11:15	How FLR has been Used	Martin Pastoors, ICES
11:15 – 11:45	Greenland Halibut	Laurence Kell, CEFAS David C. Miller, Fisheries and Oceans Canada
11:45 – 12:15	Baltic Closed Areas	Michael Andersen, Danish Fishermen's Association Francois Bastardie, DTU Aqua
12:15 – 13:00	Mediterranean Swordfish	George Tserpes, Hellenic Centre for Marine Research Markos Foundoulakis, Hellenic catching sector George Panagiotakis, Hellenic local manager
13:00 – 14:30	*Lunch*	
14:30 – 15:15	Long-Term Management Plans	Lorenzo Motos, AZTI-Technalia Marina Santurtun, AZTI-Technalia José Manuel Fernández Beltrán, OP Lugo and NWWRAC Yet to be decided, SWWRAC representative
15:15 – 16:15	North Sea Haddock	Coby Needle, FRS Marine Laboratory Mike Park, Scottish White Fish Producers' Association
16:15 – 16:45	NS Flatfish	Martin Pastoors, ICES Nathalie Steins, Dutch Fish Product Board and NSRAC
18:30	*Drinks and Conference Dinner at Renaissance Hotel*	

Day Two – March 12th 2008

9:00	*Coffee*	
	Current EU Management Challenges	
9:30 – 9:50	Generic Management Plans	Laurence Kell, CEFAS
9:50 – 10:10	Mixed Fisheries Management	Stuart Reeves, CEFAS
10:10 – 10:30	Future EU Advice Needs	Yet to be decided, DG Fisheries and Maritime Affairs
10:30 – 11:30	Discussion of Future Modeling Needs	Douglas C. Wilson, IFM
11:30 – 12:00	*Coffee*	
12:00 – 12:45	Keynote Address	Paul Connolly, Irish Marine Institute
12:45 – 14:00	*Lunch*	
	Stakeholder Response	
14:00 – 14:15	Report of EFIMAS Focus Groups	Ditte Degnbol, IFM
14:30 – 14:45	DG Fisheries Response	Jacques Fuchs, DG Fisheries and Maritime Affairs
14:45 – 15:00	Recreational Anglers' Response	Jan Kappel, European Anglers' Alliance
15:00 – 15:15	ENGO Response	Hanne Kærgaard Lyng Winter, Greenpeace Denmark
15:15 – 15:30	Industry Response	Mike Park, Scottish White Fish Producers' Association
15:30 – 16:00	*Coffee*	
16:00 – 16:15	Industry Response II	Nathalie Steins, Dutch Fish Product Board
16:15 – 16:30	Member State Manager Response	Marc Welvaert, Belgian Sea Fisheries Service
16:30 – 17:00	Modellers' Questions to Stakeholders	
17:00 – 17:15	Closing Remarks	Poul Degnbol, DG Fisheries and Maritime Affairs

Conference venue:

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