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INFORMING THE GLOBAL FISH

February 2009

The democracy of EU-Scottish herring

A clear shift of power took place in the run up to 2009, as fishermen mobilised their allies with common sense and good data to influence annual stock management decisions by EU ministers, reports *Peter O'Neill*.

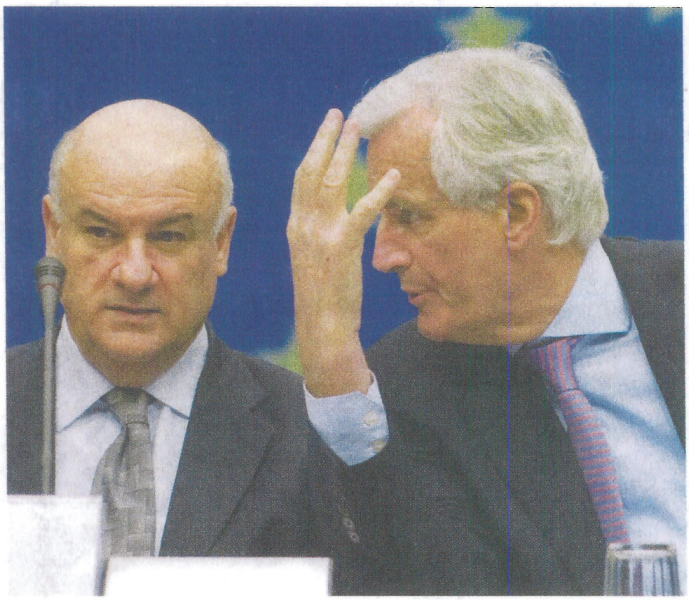
The EU Commission (EC) and scientists had proposed what some berated as the 'blunt' instrument closure of West of Scotland herring boxes. This could have knocked out cod, haddock and whiting catches and holed the nephrops' industry.

The closure proposal was finally abandoned by ministers, a recognition that fishermen can be trusted to be selective and work for sustainable, local management.

By 'frontloading' (getting some stock decisions out of the way earlier in the year) this meant ministers had more time at their the pre-Christmas 18-19 December Council meeting. The usual chaos was reduced to a few late-night skirmishes. Fishermen boldly rejected an initial herring compromise, shot their doors again and pulled in a resounding catch. The value added was that more 'real' fishermen's data, not just 'scientific' models, not only made it onto the agenda but won the argument.

The moral: small groups of fishermen are easy to bypass, but their allies in regional and pan-European parliaments cannot be ignored by the EC and Council. All fishermen across the EU can benefit from early tactical planning, backed by their year-round data collection. This maximises their frontline position compared with scientists' occasional test catches and modelling.

Scottish fishermen were ready for action after scientists, in early November, proposed fishery closure whenever the herring biomass might drop below 50,000t (there were other permutations which can be seen in the Council report*).



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Fisheries' Commissioner Joe Borg (left) and Council President Michel Barnier face the press after the December herring breakthrough by fishermen

The European Parliament (EP) fisheries' committee responded with a clear "No" and with others advocated an intelligent strategy. The same week, the matter was formally put into the Scottish Parliament (SP). Its agriculture and fisheries' committee was officially briefed about the closure danger and linked risk to the £50m Scottish nephrops' industry. Official Scottish government research says "Scotland takes about one third of the total world Nephrops [sic] landings, and is allocated the majority of the North Sea and Scottish west coast Total Allowable Catches (TAC)".

Scottish MEP Struan Stevenson wrote the first report for the EP fisheries committee. A month later on 4 December, its plain facts, against closure and for intelligent management, were swept along by a tidal wave of all Europe's MEPs who voted 529 for, 49 against with nine abstentions.

The Euro currency of mediaeval Europe, a barrel of herring, was back.

The cod conundrum, and all discard management, remain works in progress. The EC/scientific bloc must maximise cod's resurgence, not over focus on waste. Witness the cited 2006 research by Catchpole et al. – 'waste"' from the Scottish nephrops' fishery provides 37 per cent of food for scavenger fish.

Scottish fishermen will get some funding for what will be a major, tough reorganisation of their catch operations but the SP said it will fast track the funding.

A more sophisticated management approach, led by the fishermen, has won the day.

*http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/agricult/104997.pdf

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worldfishing

February 2009
Volume 58
Number 1
ISSN 0043 8480

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World Fishing is published by:
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Fareham, Hampshire,
PO16 0RA, England
Tel: +44 (0)1329 825 335
Fax: +44 (0)1329 825 330
Registered in England Company No. 2427909
VAT Reg. GB806 6457 19

World Fishing is published 11 times p.a.

Single issue: £9.95 +pp

Subscription Services
Yearly World Fishing subscription, which includes the World Fishing Online service:
UK/Europe £102
Worldwide US$200
E-mail: subscription@worldfishing.net

Printed by
Holbrooks Printers Ltd
Norway Road, Hilsea,
Portsmouth, PO3 5HX

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INVESTOR IN PEOPLE

Copeinca to produce fish for human consumption

Peru's Copeinca is to diversify into fish for human consumption, the company has said in a round of media interviews, reports *Michael Mackey*.

This represents a fairly sharp turn of strategy for the 24 year-old company. Until now a fishmeal and fish oil company, Copeinca is the second largest of its type in Peru and the third largest in the world. The company operates 65 vessels (with a capacity of 21,935m^3) or 10.4% of the industry and 12 plants, the company's website said.

Following a year of consolidation after a round of acquisitions in 2007, Copeinca will, this year, enter the new market tranche via ventures in the canned, chilled and aquaculture sectors.

This will not be done by a further round of purchases but by reorganising the acquired companies. For example it does not need to purchase any new boats, as it acquired 15 refrigeration ships when it bought Fish Protein in 2007. The same buying spree saw it purchase chilling plants at Chimbote and Paita and an aquaculture and canning business at Tumbes, in Peru's North.

Copeinca will diversify into fish for human consumption

One of the biggest and prioritised parts of this reorganisation will be the listing of the new human consumption company.

"This project is at the stage of being structured, though the chilling and canning plants are almost ready to operate," Samuel Dyer Coriat, general manager of Copeinca told one newspaper.

Mr Dyer is also confident that the financial crisis will not delay these plans. Not only has Peru so far been relatively insulated from the credit crunch and its aftermath but the company's products will always be needed. "We are talking about basic foodstuffs in many cases, and we don't believe there will be an end to their consumption."

In another sign of confidence Mr Dyer also hinted that the company's ambitions do not stop here. Peru, he said, offers opportunities for greater consolidation "and although we haven't foreseen it, we are always attentive to the opportunities which present themselves. To go foreign is another alternative."

Fishing generates more than two million jobs in US

US commercial and recreational saltwater fishing generated more than $185 billion in sales and supported more than two million jobs in 2006, according to a new economic report released by NOAA's Fisheries Service.

The commercial fishing industry – harvesters, seafood processors and dealers, seafood wholesalers and seafood retailers – generated $103 billion in sales, $44 billion in income and supported 1.5 million jobs in 2006, the most recent year included in the report, Fisheries Economics of the United States, 2006, which covers 1997 to 2006.

Recreational fishing generated $82 billion in sales, $24 billion in income, and supported 534,000 jobs in 2006.

"The report documents clearly that managing fisheries sustainably is good for the environment and the economy," said Jim Balsiger, NOAA acting assistant administrator for NOAA's Fisheries Service. "Fishing helps create a substantial number of jobs around the nation."

Fishing generated more than two million US jobs in 2006

Managing fleets and fisheries

J. Rasmus Nielsen and *Morten T. Limborg* from the Technical University of Denmark, DTU AQUA, look at implementing fisheries management evaluation tools capable of comprehending both the biological, economic, sociological and spatial dynamics of the fisheries system.

European fisheries are under pressure. Many commercially important fish stocks are declining and so are the number of fishing boats and people employed within the fishing industry. Management and regulation of fisheries are becoming continuously more complicated. Stakeholder confidence in existing assessment and management models is shaken and more efficient management regimes are called for.

Existing models in fisheries management advice (FMA) only consider effects of overall fishing on single fish stocks, while not taking broader ecosystem, social and economic impacts of management decisions into account. Mixed fisheries aspects where several fishing fleets fish on several stocks in the same fishery, spatial planning, and long-term management strategy evaluation are also not considered adequately.

In response to this situation, managers have launched new programmes aiming to develop alternative management evaluation tools and management strategies that have broader, multi-disciplinary and long-term perspectives. These include social and economic impacts and ecosystem impacts (e.g. by-catch and discards) besides biological consequences on single stocks. Consequently, a new trend has emerged in thinking international fisheries research and FMA by developing conceptual and comprehensive multi-fleet and multi-stock bio-economic simulation tools and management evaluation frameworks (MEF) being spatial and seasonal explicit. A successful implementation of ecosystem, social and economic dynamics and factors on a spatial scale in the advisory process is a major leap towards more holistic and sustainable management within EU waters and fisheries. Furthermore, MEFs enable higher degree of participatory management evaluation by involving various stakeholders in FMA.

Scientific basis and development

Results from multiple international and national European research projects are summed up and joined in the paradigm shift approach in thinking and practising FMA. The current advisory system was evaluated to improve allocation of resources according to use and cost-efficiency. Specific EU-policy shortcomings were studied to devise means for their rectification and methods for defining and characterising fleet and fisheries dynamics were developed. Technical developments and efficiency increase over time in fishing fleets (e.g. gears and vessel equipment), as well as patterns and developments in fleet and fishermen's behaviour were evaluated in several projects. From this knowledge, new programmes focused on developing MEFs able to consider broader bio- and socio-economic effects of alternative management options before potential implementation, and to more directly investigate broader dynamics of the system, i.e. fishing fleet dynamics. This is needed for development of multi-disciplinary models combining traditional management procedures with subsequent responses by fishing fleets and fish stocks (TECTAC, CAFÉ). The arising inter-disciplinary trend also includes key elements in multi-annual management strategies and making these acceptable to fishermen and optimising their commitment and compliance with regulations.

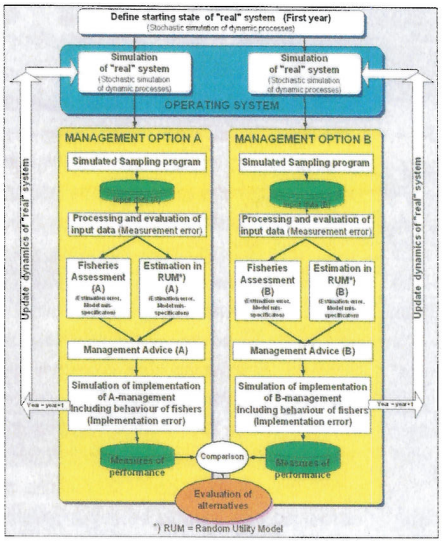

Fig. 1: Diagrammatic example of MEF phases evaluating and comparing two (A & B) alternative management options

Another important aspect is the development of advisory models enabling an ecosystem based approach to marine management and spatial planning, also addressing dynamics of fleets and fisheries. Socio-economic objectives are included by considering biotic, abiotic, and human components of influences on ecosystems and through an integrated approach to fisheries within ecologically meaningful boundaries. Focus is on spatio-temporal closures and more selective fishing gears to minimise negative ecosystem impacts by protecting certain habitats and to reduce unintended by-catch and discard of certain species and sensitive life stages. Spatial explicit management evaluation and advisory tools on fleet basis were developed in EU-FP6-PROTECT-513670 and EU-FP6-EFIMAS-502516.

To facilitate better fisheries management regimes, recent projects (e.g. EFIMAS) use state-of-the-art knowledge to develop actual and holistic operational MEFs. Being the largest among a string of recent EU supported research projects, the Danish (DTU-AQUA) coordinated EFIMAS project exemplifies the develop-ment of the new concept and evaluation tools in FMA and how scientific advice is likely based in foreseeable future (http://efimas.org; http://flr-project.org; http://wiki.difres.dk/efimas/doku.php?id=efimas;).

State-of-the-art knowledge base

A major challenge is to synthesize the best possible worldwide knowledge to develop European relevant MEFs with broad coverage of main current and emerging management problems and issues. Initially, EFIMAS participants reviewed the state-of-the-art knowledge base for different basic and existing fisheries management systems of relevance for Europe including their institutional set-up and synthesized this in a book-publication, *The Knowledge Base for Fisheries Management* (ELSEVIER 2006). This includes generating advice for fleet based, ecosystem based, and participatory management in cooperation with multiple stakeholders.

This synthesis was used in a feedback process to develop the MEFs including fishermen and other stakeholder perspectives. Lastly, the book focuses on management scenario modelling and methods and their central role in future EU FMA. Based on the book conclusions on needs to improve current management and advice the developed MEFs were made flexible enough to include a broad range of options under alternative systems.

Platform for management evaluation and advice

EFIMAS, and sister projects, developed and integrated a set of new and existing software tools and simulation models, generating a more robust Management Strategy Evaluation (MSE) framework that allows testing plausible hypotheses about dynamics of fish stocks, fisheries and fleets. The MEF contributes to a conceptual change and paradigm shift in generating advice and management with entire fleets and fisheries as the central units. Here the basic management instrument is the input, i.e. the capacity of fishing fleets in form of number, size and efficiency of the vessels, and their fleet and fisheries based effort (activity). This differs from the traditional output based ICES approach providing advice on single fish stock catch limits from rather uncertain terminal year stock assessments and under strong assumptions on future total stock fishing mortality (F), without much consideration on factors creating and controlling F and partial Fs by fleet. The developed frameworks allow simulating and evaluating, respectively, the biological, social and economical consequences of a range of proposed management options and objectives within different management regimes.

Managing fisheries in a virtual environment provides more reliable scientific advice to stakeholders: In the same way that a pilot might fly in a simulator before flying for real, the simulation tools evaluates the robustness of alternative strategies and virtual regimes to give more holistic FMA in broader context before implementation. This provides managers and stakeholders a better idea of the consequence of a given strategy or intervention before opting for a particular management approach.

To accomplish this, EFIMAS involved 30 European

universities and research institutions covering fisheries biology, economy and sociology, and established a multi-disciplinary scientific network of excellence.

Developing a management evaluation framework

In particular EFIMAS has: (i) used and developed computer based models that can run stochastic simulations incorporating data from selected EU fisheries and stocks considering fleet interactions, and (ii) through scenario evaluations compared the performance a range of current and emerging EU management options under alternative management systems and objectives (Fig.1).

Fig.2 shows a conceptual box flow diagram of the overall simulation module. The input data is generated by a descriptive model (operating model), which is assumed to represent the 'true/real' system. The input data is then processed by a traditional or an alternative fish stock or fisheries assessment model or economic fishery model (knowledge production model), which is used to generate FMA.

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. These measures enable comparison of a range of options under alternative systems and objectives under consideration of uncertainties in all of the processes.

The developed MEFs can evaluate fleet and mixed fisheries interactions and fisheries behaviour (see box). They evaluate uncertainties in stock and fisheries dynamics, data collection, assessment, modelling, as well as the advisory, management and implementation processes. Being capable of evaluating the relative performance of multiple alternative options the MEFs possess strong capacity in performing sensitivity and risk analyses of consequences.

Evaluation of framework performance

The overall evaluation comprises process evaluation (PE) and technical evaluation (TE). PE focuses on participatory management. Here participatory and iterative scenario-based MEF modelling is used to obtain input and cyclic feedback from multiple (regional) stakeholders for different options, and to test the general utility of the operational MEF during (i) development, (ii) case study applications, (iii) evaluation of case specific results, and (iv) overall efficiency to capture changes in the fisheries systems and the applicability in other stocks/fisheries (general utility).

European fisheries management and advice change rapidly toward a more responsive and efficient system. Increasing stakeholder participation in decision making is central and brings about changes in the role of science. The developed MEFs inform an exploratory and adaptive decision-making process enabling science-based policy even when uncertainty is high.

Participatory modelling does not substitute for using science to set limits, but can focus on crafting strategies and force stakeholders to clarify their objectives and explicitly address the trade-offs implied by various strategies. MEFs facilitate collaboration across disciplines, ensures that models and software are easily validated, and widely available. The main MEF is an open software source (http://www.R-project.org) promoting transparency and allowing technology transfer and development internationally and across disciplines. The software aims at user-friendliness when experts are to implement it in cooperation with stakeholders. As such, the suite of projects has helped to restore the somewhat shaken trust of stakeholders by incorporating a wider range of variables to illuminate the decision-making process and make it more accessible to them.

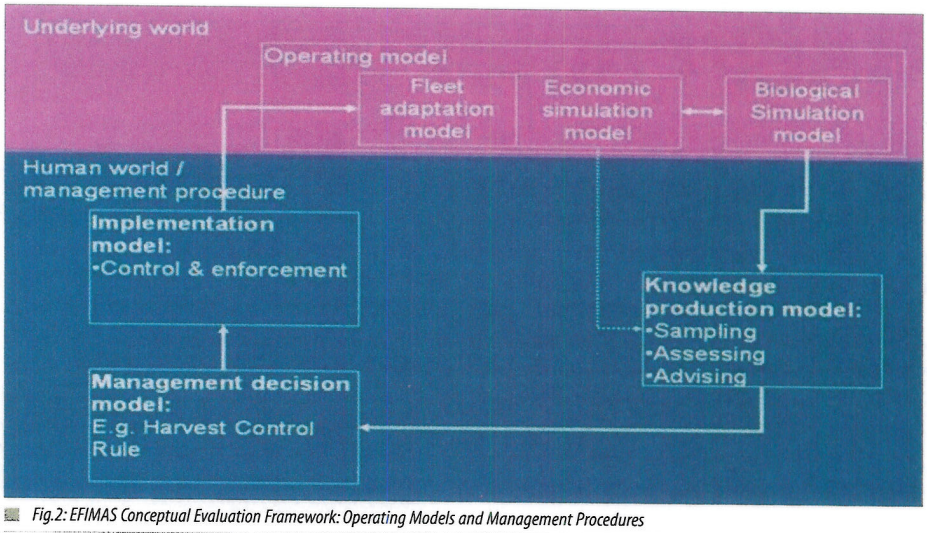

Fig.2: EFIMAS Conceptual Evaluation Framework: Operating Models and Management Procedures

Technical evaluation

TE includes built-in facilities, capabilities and utilities to evaluate uncertainty, errors, sensitivity, robustness, predictive power and limitations in use through rigorous tests of validity of assumptions and hypotheses on processes and states of the resource and fisheries systems. Further, TE includes MEF utility in terms of technical requirements for set-up and use.

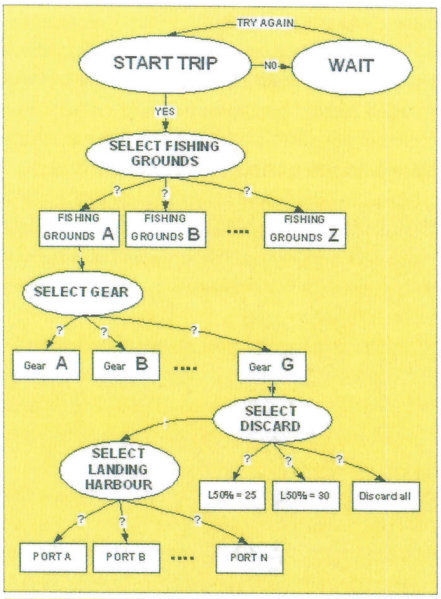

Fig. i: Decision tree for fishing trip related fisherman and fleet behaviour.

Modelling fishermen and fleet behaviour

It is necessary to simulate and establish models for how fishermen and fleets and the advisory systems will react to different management measures, i.e. to establish fisheries behaviour models and advisory process models in the MEFs. Fisheries behaviour can be divided into (i) 'strategic or structural behaviour' and (ii) 'tactic or trip related behaviour'. The first accounts for the investment in new vessels and withdrawal from the industry (e.g. decommission), thus reflecting long term trends, while the latter accounts for short term decisions by the single vessels for fishing operations (Fig. i).

Project results and dissemination as examples

The MEFs have been continuously tested in several cases covering important EU fisheries, areas, and a broad variety of existing and world wide emerging and innovative management options and systems to illustrate the capacity of the MEFs. This covers regulation by traditional TAC (Total Allowable Catch) including possible catch misreporting, multi-annual TACs, direct effort control and decision rules systems, indirect effort control through spatial and temporal closures, rights-based approaches (e.g. individual transferable quotas) and participatory governance, as well as use of different stock assessment models or models for economic dynamics.

The use covers many ICES stock assessment and mixed fisheries working groups, EU STECF working groups, EU RACs (Regional Advisory Councils), NAFO Scientific Council working groups, ICCAT and IWC working groups, and dissemination through many scientific peer reviewed papers, conferences, user courses, and workshops under EFIMAS.

Future perspectives

Future perspectives are to fully integrate the MEF in standard ICES and EU (STECF) management advice procedures and implement participatory and scenario based modelling in proper institutional context with advice from the established multi-disciplinary scientific networks of excellence and research platforms. Also, the aim is to develop and design the flexible MEFs further towards new processes and approaches including ecosystem based management advice considering biological interactions to comply to anthropogenic effects on the entire ecosystem and climate induced effects. As such, the MEF(s) can be used to define new status and management indicators and precautionary limits according to induced changes when evaluating management scenarios. Such integrated modelling will be the new generation of management advice and bring it to the next level.

Acknowledgements cover the significant contributions by DTU-AQUA, EFIMAS and COMMIT colleagues to this development. Visit www.aqua.dtu.dk or email rn@aqua.dtu.dk, mol@aqua.dtu.dk for more information.