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

Theme Session R – More for Less – delivering more science with fewer resources: How do we make best use of our investment in science through joint programming, communication and knowledge management

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As the demand for scientific advice and evidence increases there is a risk that human and institutional resources will not be able to keep pace with this demand. For example both the Green Paper on CFP reform and the Marine Strategy Framework Directive highlight an increased need for science. To help address this potential risk we need to make maximum use of our investment in science. The MariFish ERA_NET, which brings together the major funders of fisheries science in Europe has identified three key areas which can help close the gap: increased use of joint programming at the regional scale; improved communication between managers and scientists; and enhanced use of knowledge management. Funders and scientists on both sides of the Atlantic will not be surprised with these conclusions and will agree that we need to make maximum use of our investment in science. The overall aim of this session is to examine these aspects, to compare the approach between EU, USA and Canada, to open up the debate, and help find solutions.

Joint programming

Across Europe and in North America there are big multidisciplinary questions related to fisheries ecosystems that need answering, including how can we adopt an ecosystem-based approach at the regional scale; how do external factors such as temperature and oceanographic processes affect recruitment; and what will be the impact of climate change on fish stocks? No single funder, nor research institute, can answer these important questions alone. We need greater collaboration between funders and scientists if we are to make progress, but to achieve this requires us to work outside of our silos and presents us with many challenges, such as agreeing on research priorities and developing collaborative funding. All this points to the need for increased attention to be given to Joint Programming. The aim is to examine joint programming that already exists in the ICES area and to consider opportunities for further collaborative working, between funders and between scientists.

Maximising our use of science through improved communication and knowledge management

The relationship between 'customers' for research and the science providers, or 'contractors', is complex – science is not a straight forward commodity to purchase. The MariFish partnership has made 'Strengthening the links between marine fisheries science and fisheries management' its central theme and in the course of its work has identified two important areas which need to be addressed – communication and knowledge management.

- **Communication**. Customers of science need to express clearly what the management questions are and what evidence is needed. For their part scientists need to provide answers in a language that is understandable to the non-specialist, including the fishing industry. Without an effective two-

way communication process in place there is a risk that the substantial investment in fisheries science may not be used as effectively as it could be in identifying problems and delivering answers.

- **Knowledge management**. Knowledge or 'evidence' is fundamental to fisheries management. Managers, science advisers and scientists are finding it increasingly difficult to keep abreast of the available knowledge. Important questions include do we use existing knowledge to best effect, have we invested sufficient time and resources in science audits and reviews, and do we rely too heavily on 'codifiable' knowledge and not enough on 'tacit' knowledge – knowledge inside people's heads?

The overall aim of Session R2 is to explore ways of improving the effectiveness of our investment in marine science through better communication and the effective use of knowledge management. This session provides an opportunity to open up the debate between managers and users of science and the science community, to highlight good practice that undoubtedly exists, and enable the MariFish partnership and others to make more effective use of fisheries science budgets in the future. The session will help identify blockages and explore potential solutions, for both customers and contractors of science. Papers relevant to this session will examine the wider aspects of communication and knowledge management and present examples of where communication is working well and why; how to improve the two-way communication between managers and scientists, and with other stakeholders including the fishing industry; studies into knowledge management and examples of good practice.

Summary of Session R Sub-session 1:

Communication and Knowledge Management

Introduction

The session's overall heading, 'Delivering more science with fewer resources', reflects a concern that demands for scientific advice and evidence are increasing, the systems being addressed are more complex (or more of the existing complexity is being considered), but budgets are being tightened. We must therefore make best use of our investment in science through joint programming, and effective communication and knowledge management. This report summarises the first part of session R which focused on knowledge management and communication.

The 16 papers covered a wide range of examples and challenges seen in initiatives aimed at enhancing communication and knowledge management. Three key themes emerged:

1. Knowledge management: making the best use of what is already known through effective analysis, synthesis and person-to-person interaction;
2. Generating new knowledge effectively to inform fisheries policy and decision making; and
3. Engaging with the fishing industry and other stakeholders to gain access to and develop better knowledge for them and for policy.

Knowledge management: analysis, synthesis and person-to-person interaction

Knowledge-rich organisations can, too often, fail to make effective use of existing information which may remain hidden from the view of those who need it. Attempts to introduce knowledge management systems often under-deliver if there is too much

of a focus on technological approaches to knowledge management - such as ambitious databases or intranets - instead of a more prosaic focus on connecting the people who have and need different aspects of the complex knowledge involved in an area such as fisheries. However, there is still a role for the targeted use of ICT in fisheries; project databases can help to connect up disparate groups with similar interests, and electronic logbooks have proved useful for fishermen, researchers and fisheries managers alike.

Many problems arise with technological solutions: databases and intranets can be too complicated to use (both for those inputting and extracting knowledge); too simple or narrow so they are unable to address new needs; or fall into disrepair through lack of maintenance and continuity. In addition, there is a limit to how much knowledge can be codified (written down), and knowledge management initiatives should put appropriate emphasis on accessing and mobilising tacit knowledge - the knowledge in people's heads (try telling someone how to ride a bicycle by writing it down!). The development and population of databases must recognise the constraints on people's time, and ensure that 'there is something in it for them' to motivate their involvement.

Nine 'Golden rules' for knowledge management initiatives were presented. These included the need to prioritise the sharing of knowledge as well as its discovery, building resilience by balancing information capture with connectivity (connecting people), and emphasising the relevance of knowledge and research in peer review and project selection processes, not just more traditional measures of scientific quality such as rigour and validity.

The value of collation and analysis of historical knowledge - much of it in the form of hand-written notebooks that in one example were nearly thrown away - was discussed in relation to records of the distribution of marine and intertidal species around the UK. Dating back up to 100 years, these data have proved invaluable in providing information on long-term trends to inform climate change policy. Their availability owes much to the value placed on 'old people' - retired members of staff - not just old data, who in the UK's Marine Biological Association were provided with the facility to continue to work and contribute after their official retirement.

The systematic review of evidence on the effectiveness of interventions sits at the heart of decision making in the health sector, and has also been widely used in relation to social issues such as education and welfare. The technique has recently been extended to environmental issues, and is considered to have much to offer decision making in marine fisheries management. It comprises a rigorous scientific approach to interrogating the existing knowledge base to maximise transparency and minimise bias, and a social process enabling consensus to be developed on appropriate actions to address problems. Various speakers presented case studies involving similar knowledge processes aimed at providing policy advice in complex areas.

Generating new knowledge effectively

If gaps in required understanding remain despite effective accessing, analysis and synthesis of existing information, then new knowledge may need to be generated through research. A strong message of the papers addressing this issue was the need for a strong user orientation in the design and conduct of the research while maintaining the highest standards of scientific independence and quality. An effective dialogue should be maintained with the intended users of the research, be they fisheries managers, policy makers or other stakeholders, in agreeing the research questions, as

the research is undertaken, and in supporting the interpretation and uptake of the research results.

Research questions need to be appropriately framed to reflect the different perspectives of the various 'customers' for the research, and to ensure that issues are addressed at the right system level. Researchers need to focus on outcomes and not just outputs, and this focus is encouraging more interactive and multi-disciplinary "systems" approaches in several cases outlined. Communication of the research findings should use appropriate channels and formats: many speakers stressed the value of face-to-face interaction between researchers and research users, enabling the interpretation of the implications of research results for the policy decision, and enhancing researchers' knowledge and understanding of stakeholders' views. Providing advice on fisheries management and policy questions is often the mechanism whereby research outputs inform decision making.

The role of the advisor or 'interpreter' of research is considered key: incentives, training and career paths need to be made available so that researchers are motivated to undertake this role and are equipped with the skills to do so. More generally, the required communication between researchers and research users needs to be adequately resourced in research planning and management.

Engaging with the fishing industry and other stakeholders

Perhaps the strongest message from the session was the increasing emphasis that is being put on engagement with the fishing industry and other stakeholders: over half the papers addressed case studies involving various ways to do this. Such engagement is valuable in enabling the development of better knowledge to inform policy, and also in ensuring that researchers, fishers and other stakeholders are better informed when engaging with fisheries policy making and in making their own operational decisions. It brings a new focus to research and data analysis activities, requires new approaches and modes of communication, and extends the scope of the relevant science.

With regard to this last point, the value of various social science approaches in the new research paradigm was stressed. Survey methods - both quantitative and qualitative - had proved useful in several successful projects, helping to get under the skin of what is happening in particular fishing communities. These methods can produce surprise results - such as the scale of recreational sea fishing, and the unexpected opposition of many fishermen to double-net trawling (despite taking it up). Societal expectations about the availability of relevant information on issues of interest are becoming more demanding, and several of the papers dealt with the challenges of conducting research, and synthesising and communicating information to be helpful to stakeholders throughout the value chain involved in fisheries. This is recognised as being relevant to the bio-economy as a whole, and the European Commission"s communication and knowledge management strategy was described which aims to enable open and informed dialogue, and the successful dissemination and application of research results.

Ensuring effective communication between researchers, policy makers and stakeholders as such research is conducted is important, and an example was presented of the use of network analysis tools to evaluate the connectivity of the various players in a research project. A further step can be to focus on achieving outcomes in respect of the sustainability of fishers' activities, not just research outputs to inform those actions, and examples were given of where this had been successfully achieved. Some-

times this demands uncomfortable new approaches from researchers - such as when asked to take a back seat and mainly provide support to the fishermen engaged in one research project.

Effective engagement with fishers in the design and conduct of research can also generate knowledge which is more robust and of greater value to policy makers. For example, it can address issues of *why* fishers adopt certain strategies, not just questions of *how* they fish or *what* they fish for. Novel approaches are needed to combine different kinds of knowledge, for example from scientific experiments and operational fishing vessels. If well handled, research conducted in collaboration with fishers can result in shared ownership of the findings, and help to build better relationships between researchers and fishers which can be of value to future research. We also heard that it can be stimulating, productive for both research and policy, and fun.

Conclusions

The session proved to be of great value to those who took part, as reflected in the lively discussion period that brought it to a close. Several participants felt it far surpassed their expectations and had challenged them to think differently about the whole research process and the relationship between research, researchers and the various stakeholders in the fisheries community, including policy.

The facilitators identified five generic issues to have emerged from the presentations:

1. the challenges to traditional research approaches that are emerging in the area of marine and fisheries policy.
2. the strength of the finding that the more researchers engage with the fishing community the more they acknowledge how much fishers know, and that their knowledge can be a key resource for fisheries research and policy; it can also be productive and fun to work with them.
3. the usefulness of a focus on the needs and perspectives of the various stakeholders of fisheries research, at all stages of the research process: formulating research questions, conducting and analysing the research, and formulating ways forward for policy.
4. the value of a variety of rigorous social science approaches and methods as part of a rounded research approach that aims for outcomes as well as outputs.
5. and finally, the fact that in different ways, many of the presenters were talking about their search for wisdom in the area of fisheries livelihoods, research and policy. We know that our knowledge and technology are now so powerful as to be able to undermine the future sustainability of fisheries, and this challenges all involved to develop shared wisdom about the prudent use of the seas' resources.

The outcomes from this session can be directly applied across the ICES science community to inform any future attempts in developing effective approaches to knowledge management and to make maximum use of our investment in science. Research without effective knowledge management and communication falls far short of its potential but is sadly all too common. This need not be the case in the area of marine and fisheries policy now that many of the straightforward but effective ways of managing and communicating knowledge have been so clearly outlined. All that is needed now is the will, resources and leadership to make it happen.

Summary of Session R Sub-session2 on Joint Programming

Co-convenors: Maurice Héral and Steve Murawski

Overview:

Maurice Héral: From joint call to common research programmes.

The marine ERA-NETs MarinERA, MariFish, and AMPERA achieved an inventory of research activities and launched some common research calls. Only MARIFISH, within the workpackage 7, has developed common programmes on an ecosystem approach to fisheries and on a regional base such as the channel programme on the impact on fisheries on benthic habitats in relation with CHARM and the Mediterranean programmes, 2 examples of these common programmes will be presented later in the session.

One step further is to promote the integration of the different ERA-Nets in the new ERA-Net Seasera.

In addition, the new Joint Programming Initiative on Healthy and Productive Seas and Oceans will strengthen the structuration of marine research in the EU Member States.

What will be strategy of ICES in this context?

Waddah Saab: What are the EU objectives and instruments to facilitate common programmes?

DG research presented the different instruments to facilitate the JPI: (i) moving from ERA-NETs, to ERANET plus and the article 169 (ii) the decision of the member states to go further in 2010 in marine cooperation by the selection of a Joint Programming Initiative. The formal approval is still on progress in 2010.

The member states representatives will have to produce a strategic agenda with precise actions and calendar to develop some specific common programmes.

Andris Andrusaitis: BONUS: Building the Joint Baltic Sea Research Programme.

BONUS began with an ERA-Net, produced a common call supported by the member states and the EU commission within an ERA-Net plus and now moves towards a 169 article involving all the Baltic member states. BONUS will remain under the umbrella of the overarching ERA-Net Seasera to have cooperation on the global approaches and methodologies exchanges.

Examples- Innovative common research bilateral – multilateral programmes:

Giannoulaki Marianna and Magdalena Iglesias presented two cases studies of potential habitat for sardine and anchovy as well for the spawning adults in the reproductive areas, the juveniles, and the adults. Models function on the environnemental conditions determined by remote sensing and observation of biomasses has been addressed to produce maps around the Mediterranean coast. This work has been elaborated in MariFish WP7 and lead by Greece, Spain, France, Croatia, Italy. It also needs to be validated in the southern part mainly in Tunisia.
Title: Habitat suitability modeling for sardine in a highly diverse ecosystem: the Mediterranean Sea

Title: Identifying the potential habitat of anchovy Engraulis encrasicolus during different life stages in the Mediterranean Sea

Maria Ching Villanueva presented the results concerning EU long time cooperation on the British Channel through 3 intereg projects (CHARM). A comprehensive description of the habitat has been achieved in an Atlas as well for habitat description and the fish behavior with the spawning areas, the nurseries and abundance of the adults. Further studies are ongoing on the trophic ecosystem modelling and on the impact of fisheries on the biodiversity of the benthic species.
Title: The Charm Project: Defying the Channel's loss by facing environmental challenges across borders

Thomas Bastian proposed to develop a survey of jellyfish in association with the stock assessment campaign. He presented the Irish resuts.
Title: How fish surveys provide a 'backbone' of jellyfish research

Six interesting posters have been presented during the poster sessions with examples of other common programmes which are ongoing.

Author: Tom Jaffarian
Title: *Survey Specific Software Saves Time and Increases Data Integrity*

Author: Nils Olav Handegard
Title: *Adaptive management of living marine resources by integrating different data sources and key ecological processes (ADMAR): A joint effort by IMR and CEES*

Author: Sara Hornborg
Title: *Finding keys to sustainable fisheries- exploring the potentials of using LCA to evaluate the performance of fisheries management*

Highlights:

I. ICES is a good forum to address a debate on common programmes as, since a large number of years, ICES plays a role between its member states to coordinate research, campaigns, collaboration, expertise…
Across Europe and North America large international programmes such as GLOBEC have been developed in cooperation with and coordination of ICES. With the recent economic crisis and resulting decreases in budgets mainly for European countries, it becomes more urgent to organize ourselves to work more closely together, more efficiently to create critical masses, infrastructure sharing...
The question was asked about the role of ICES in order to promote joint programming, particularly between European and North America countries.

II. How can ICES common programmes can be part of a European strategy for the coordination of programmes (New ERA-Net Seasera – WP2 and JPI proposal on Healthy and Productive Seas and Oceans)

III. The sub-session has been a good opportunity for highlighting the value and success of common programmes, developed without any additional funding within the MariFish WP7.

IV. A common programme on a jellyfish inventory by using the fish survey has been proposed as part of an ICES common programme.