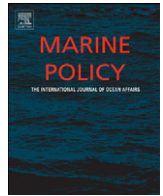




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Engaging stakeholders in fisheries and marine research

S. Mackinson^{a,*}, D.C. Wilson^b, P. Galiay^c, B. Deas^d^a Centre for Fisheries, Environment and Aquaculture Science, Pakefield Road, Lowestoft, Suffolk, NR33 0HT, UK^b Innovative Fisheries Management, An Aalborg University Research Centre, Department of Development and Planning, Room 85, Fibigerstræde 13, 9220 Aalborg Ø, Denmark^c European Commission, Research Directorate-General, Governance and Ethics, Square de Méeûs, 8 1050 Brussels, Belgium^d National Federation of Fishermen's Organisations, 30 Monkgate, York YO31 7 PF, UK

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ABSTRACT

Despite knowledge-brokering being of high interest to public policy, there is a lack of research integrating the knowledge of stakeholders and scientists, principally because public policies remain viewed as top-down controlled. To help European research policies make a positive difference to society, there is a need to better engage stakeholders with the delivery of research and to demonstrate an impact and value that it brings. The pertinent question addressed by this communication is: how can a deeper and more systematic engagement of stakeholders be enabled through European research activities? Enabling stakeholder participation in European research activities requires there to be an incentive for researchers and stakeholders to engage, and the capacity of stakeholders to operate effectively in the research framework. Unsurprisingly, the establishment of communications and cultures conducive to shared problem solving is high priority, as is the need to work towards a governance structure that helps link research with policy outcomes, while at the same time resonating directly with stakeholders. The Regional Advisory Councils could be a strong force in bringing stakeholders knowledge to bear on the scientific issues relevant to management, but their strategy and capacity to mobilise the skills to do so are not yet ready.

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1. Introduction

Engaging stakeholders in research and decision-making on European marine issues is endorsed at high levels because agreement of stakeholders is believed to be essential for any management plan to succeed. The principal desired outcome of stakeholder participation in research is to improve the scientific data and knowledge required for management and governance.

Organised accordingly, the purpose of this communication is to:

- (i) Establish the rationale for stakeholder participation in research.
- (ii) Examine (at the European level) the practical and institutional opportunities and constraints to enabling participation.
- (iii) Identify and prioritise the steps for moving forward, by proposing a framework for improving the participation of stakeholders in research based on existing structures.

This communication is based upon the outcomes of a discussion among research programme officers of the European Commission (DG Research), stakeholders, researchers and policy makers (DG Mare) on the approaches and mechanisms to enable an active engagement of stakeholders in European research on fisheries and the marine environment (February 2009). It represents the understanding and views of the authors, not necessarily of all those who participated.

1.1. Definitions and clarifications

Here, 'stakeholders' refer to all those with an interest in the science and management of fisheries and the marine environment. It is a broad term that captures many 'actors' from society. The principle fisheries stakeholders are fishermen and their representative organisations. Other stakeholders include fishing communities, dependent industries, management agencies, Civil Society Organisations (e.g. WWF, Bird Life International, Friends of the earth) and other citizens. The different interests and responsibilities of stakeholders (from grass roots to international policy) determine the roles they play in the overall governance system.

Participatory research is a means of active engagement, and can be seen as an alternative cultural approach to doing science.

* Corresponding author. Tel.: +44 1502 524295.

E-mail address: steve.mackinson@cefias.co.uk (S. Mackinson).

It means individuals and organisations working together, with both scientists and stakeholders being involved in all stages of the research planning and delivery. Participation may take a variety of forms and change over time depending on the situation and need. This can range from consultation to cooperation to collaboration, the level of participation being determined principally by scale and nature of the issues and the contribution that stakeholders are willing and able to do effectively. Prescribed or mandated participation is rarely effective.

Because this communication is about participation in research, it is necessary to clarify what is meant and understood by participation in research and participation in management decision-making. While there are common features of the two processes, and the persons involved may be the same, the key distinguishing feature is the absence of a political agenda associated with research. Scientific research aims at improving the knowledge and evidence for informed management decision-making (Table 1).

2. The rationale for stakeholder participation in research

2.1. Incentive

The European Commission has stated its commitment to reconcile the expert knowledge of scientists with the experience of fishers, through processes that build trust and foster openness and transparency. The incentive for engaging fishers (and other stakeholders) is the belief that doing so will make a positive difference to the outcomes of policy and management aimed at achieving sustainable fisheries. Specifically, the reasoning is that

including fishers knowledge and know-how will enhance scientific understanding and improve the quality of data required for scientific assessments of fish stocks, and that their involvement in decision-making will improve policy buy-in and management implementation, because of their interest in sustaining a livelihood and/or wider societal benefits. These are not merely theoretical considerations. They reflect practical fisheries management experience in many parts of the world. A cooperative working relationship between fishers and scientists is a common characteristic of the most effective management systems [1,2]. These issues were recently debated in the European Parliament [3], where it was recognised that the lack of mutual confidence and trust between fisheries stakeholders and scientists is contributing to difficulties in implementing the Common Fisheries Policy (CFP, see Box 1).

2.2. The stumbling blocks

Even though the application of various knowledge forms can clearly improve public policy, several constraints make it difficult to integrate stakeholder participation with the delivery of research in ways that make a clear difference to policy outcomes in Europe. The area where common ground among fisheries stakeholders and scientists has been most smoothly achieved has been in addressing technological and practical issues that provide a clear 'hands-on' connection between science and fishing (e.g. fishing gear studies). Finding common ground is more difficult when the shared issues focus on knowledge of processes, where alternative view points can lead to different understanding and perceptions [4]. Much of the research on interactions

Table 1
Differences between participation in research and participation in decision-making.

Research Having a stake/interest	Common to both Having a stake/interest	Decision-making Having a stake/interest
Research should be unbiased. Fisher's participation in research can be controversial when self-interests compromise the validity of their input.	Research should provide the scientific information, whereas the stakes in the outcomes influences decision-making.	Decision-making needs to balance interests of industry, environment, social economics and national interests.
Political and economic influence and accountability As far as possible, research must be independent of political decisions	Political and economic influence and accountability Reasons for participation may appear to politically neutral when they are not.	Political and economic influence and accountability Political and economic influence aspects play a strong role because decisions influence economics. Responsibility and accountability for management decisions must be clear
Role of science Good science does not equal good management. Research should give the best science that is possible, based on both fishers and scientists' knowledge.	Social dynamic of participation Social dynamics of multi-stakeholder process are similar—respect/collaboration. Participation of professional associations in research facilitates better participation in decision-making.	Role of science Sometimes decision-making is not based on incomplete or inadequate scientific information Seeks simple answers from science Decision-making takes a broader view that links the health of exploitable resources with sustaining social systems.
Level of detail Research often focussed on specific things in detail—microscopic. Benefits in learning about complexities of interactions in the ecological-economic systems	Clarity For effective participation, there should be understanding from the initial start-up of the project.	Level of detail Decision-making is often broad brush—macroscopic.
Remuneration for participating Fishers are to be paid for collaborating in research activity.	Adaptive Learning by doing	Remuneration for participating Fishers are not paid to participate in public consultations.
Long-term view Plans should facilitate collaboration over the long-term		Long-term view Decision-making should be pro-active rather than reactive.

between scientists and fishers has pointed to the importance of cultural differences between the two groups, detailing how the two groups encounter [5] and view nature [6]. More recent research has focussed on how the needs of formal decision-making make it difficult for fishers' knowledge to make a meaningful contribution even when scientists agree with it [7]. Integrating the knowledge of stakeholders and scientists has been shied away from, partly because it is difficult to tackle, and because links to public policy are difficult to establish, especially in highly centralized fisheries management systems such as the European one. Particularly in Europe, a lack of opportunity for engagement and positive reinforcement has led to apathy and a feeling by both fishers and scientists that collaborative research is overly difficult. So, how can a deeper and more systematic engagement of stakeholders in European research activities be enabled?

3. Opportunities and constraints to engaging stakeholders in European research on fisheries and the marine environment

3.1. In what ways is it reasonable to expect participation of stakeholders in research? At what level, and how does this relate to policy needs?

Recent experiences [8–12] indicate that fishery stakeholders and scientists are united by their concern over long-term sustainability of the resource; tensions tend only to arise over short-term issues that threaten economic stability. Embracing the move towards an ecosystem-based approach to management, perception and attitudes of researchers and stakeholders have been transformed over the last few years. Indeed, it is now easier to find common ground on scientific and management issues relating to the development of long-term management plans. At the European level, forthcoming reforms of the CFP and

implementation of the Marine Strategy Framework Directive provide the backcloth supporting the need for stronger, more effective collaboration.

The type of information needed to support policy and specific research projects are important in determining the level of participation of stakeholders and how iterative and interactive this should be. Where societal choices are embedded in management, stakeholders must be involved. At the policy level, participation principally involves influencing research agendas by identifying and prioritising research topics and communicating outcomes. Stakeholders can make an important contribution by influencing opinions and ways of thinking. For example, by bringing new perspectives and demonstrating that stakeholders, like managers, have a commitment to society and long-term preservation of the environment. At the research project level, active participation involves contributing to identifying, prioritising, planning, doing, interpreting, evaluation and communication of the research. Focussing specifically on research, there are a number of areas where common interests make active engagement with stakeholders particularly amenable to research (Table 2).

Direct routes for stakeholder involvement in European research include participation in research programmes, such as the EU Joint Data Collection programme (DG Mare), or in specific research projects. It is fair to say however, that there is little European level activity, even though there has been a growing series of requests by Regional Advisory Councils (RACs, see Box 2) that scientists work with them to develop long-term management

Box 1—Common Fisheries Policy (2002)—high-level aims

To ensure the sustainable development of fishing activities from an environmental, economic and social point of view.

To improve the basis of the decision-making process through sound and transparent scientific advice and increased participation of stakeholders.

To progressively implement an ecosystem-based approach to fisheries management.

Box 2—Regional Advisory Councils (RACs) in brief

Under the auspices of the Common Fisheries Policy, RACs were established by Council Decision (EC) 256/2004 with the intention to increase the participation of those affected by the CFP in the fisheries management decision-making process. They are the main body for engaging with stakeholders on issues that directly (fisheries management and research) and indirectly (e.g. wind farms, aggregate extraction, conservation planning) affect fisheries, although stakeholders also have the opportunity to provide input independent of the RACs. Two thirds of the seats are allotted to the fisheries sector and one third to the other interest groups. Either directly or at the request of the Commission or a Member State, RACs submit recommendations and suggestions to the Commission on matters relating to fisheries management.

Table 2

Research areas where stakeholders can contribute to research to EU policy.

Research topic area	Relevance to policy needs
Mapping changes in the distribution of fishing activity (e.g. use of Vessel Monitoring System data) and resources.	Integrating Fisheries and Maritime Affairs (Maritime Policy) – relevance to CFP and EU Marine Strategy Framework Directive – particularly in light of pressures arising from marine spatial planning and need to understand patterns in response to a changing environment.
Understanding the behaviour, ecology and population dynamics of target stocks and how this influences catch rates (e.g. use of reference fleets).	Understanding and predicting the responses of fish and fishermen to changes in the marine environment. Assessing the state of stocks. Developing robust long-term management plans.
How biological interactions in the ecosystem affect long-term sustainability of resources and dependent industry (e.g. collection of biological data).	Implementation of the ecosystem-based approach and sustainable development of fishing activities from an environmental, economic and social point of view. Implications for plans to achieve Maximum Sustainable Yield.
Eliminating discarding	Limiting the environmental impact of fishing through protection of non-target species and sensitive habitats
Understanding influences on knowledge content	The further integration of experienced-based knowledge with research-based knowledge requires a deeper understanding of how knowledge is distributed among scientists and user groups and the identification of possible complementarities, deficits and biases.

strategies. The few examples of researchers and stakeholders actively engaging at a European level (e.g. Jakkfish [13], CEVIS [14] and GAP [15]) were instigated by researchers familiar with the Framework Programmes. They take into account the fact that the success of the participatory process can be as important as the science outcome, recognising that it can offer a bridge to much more. The authors are not aware of any research activities in Europe that have been instigated by stakeholders, despite a recent funding instrument (BSG-CSO) that should help enable this.

3.2. What approaches are needed to do it?

3.2.1. What 'conditions' help connect policy aspirations for improved stakeholder involvement with research?

Positive feedback from successful participatory research is a powerful incentive that stimulates greater involvement of stakeholders. Necessarily, this may imply taking a gamble with pilot projects, but the creation of opportunities can drive innovation and collaboration where not previously thought possible. Positive examples include research funded through large-scale cooperative research programmes such as the UK's Fisheries Science Partnership and the NMFS-Cooperative Research Partners Initiative in the USA. The Fisheries Scientists Research Society on the east coast of Canada has been operating since the early 1990s and is strongly supported (and often funded) by scientists in the Department of Fisheries and Oceans. A dozen European examples were linked together by the recent GAP project (see www.gap1.eu). The most influential European example has been the North Sea Commission Fisheries Partnership. This group worked closely with ICES in improving the relationship between scientists and the industry and initiated a number of research efforts including a survey of fishers' perceptions of North Sea stocks that is still ongoing. This group was also instrumental in the formation of the North Sea RAC.

Unsurprisingly, effective communication (in all directions) is essential in enabling greater involvement of stakeholders in research. Cultural differences in the communication and logic used by scientists and stakeholders mean that even when communication is good, genuine efforts at dialogue can turn into 'parallel monologues'. Working together to develop a common, shared research agenda deepens the dialogue between scientists and stakeholders and provides an opportunity to establish feedback mechanisms ensuring relationships are based on true dialogue. When scientists wear too many 'hats,' confusion about their role can undermine the trust that is essential to maintain the working relationship.

The apparent disconnect between stakeholders, researchers and policy on EU fisheries is exemplified by the situation of the RACs. Although the CFP provides the backcloth for their participation in research issues relating to the management of fisheries, their involvement is often not as good as anticipated. One of the reasons for this is the cumbersome nature of the system for requesting scientific information. Requests sent by the RACs to the Commission are re-packaged and sent to International Council for the Exploration of the Sea (ICES; the European research body for science on fisheries and the marine environment). Eventually, they find their way to relevant scientists, where the information is formulated, sent back to an ICES, then on to the Commission where it is re-packaged again, and finally sent back to the RACs. This process takes a long time. It puts glass walls in front of the original request, which serves unintentionally to distance stakeholders from science. A more straightforward (shorter) path for dialogue allows for rapid iteration of the problem and a clearer understanding by all. Some recent examples have shown the value of having more direct links from

RACs to scientists [16] (e.g. Western Horse mackerel, area VII Monkfish).

3.3. What are the structures and tools to enable it? And where are the barriers?

3.3.1. The role of the EC in creating and enabling opportunities for participation of stakeholders

The most recent wave of collaborative research has taken place in fisheries science during the last 15 years. Among the various science policy sectors, collaborative research is most common in fisheries and agriculture, because of the extensive experience based knowledge found among the practitioners. But recent stakeholder involvement in fisheries research has been weak in comparison to aquaculture, where the industry has the capacity to engage in research in an organised way (Fuchs personal communication). This has not always been the case; historically, when fisheries were under development everyone was happy to work together, but tensions that have arisen during declines of fisheries have made collaboration more difficult. Nonetheless, engaging with stakeholders is important in securing the knowledge and science required for developing long-term management plans. It requires that stakeholders work with the scientific process (through ICES) and that the research connects with stakeholders 'on the ground'.

Enabling stakeholder participation in research at the European level requires a clear connection and alignment of:

- European governance/management policies.
- Research policies.
- Structure of the funding system.
- Funding instruments.

This does not always occur, and real or perceived barriers at any stage have prevented collaboration. Some of the possible constraints that either make it difficult, or provide insufficient incentive for stakeholders to get involved are elaborated upon below.

Governance and management of fisheries: as the Commission's recent Green Paper on the reform of the Common Fisheries Policy [17] has emphasized, the CFP is seen by stakeholders as a top-down paternal system characterised by a history of negative incentives. This has eroded relationships and led to a fear of misuse of stakeholders' knowledge. For example, fear of sharing data in the thought that it will be handed over to Environmental Non-Government Organisations (eNGOs) believed to be intent on closing fisheries.

Research policies focussed on developing the science required to underpin the CFP have tended to address the science needed to support the quota management system. It rarely involves collaborative research with stakeholders. Existing research policies do not therefore connect well with aspirations of the Commission to improve the basis of decision-making on the CFP by increasing participation of stakeholders. Despite the creation of RACs as an instrument of the CFP to increase the participation of stakeholders in the management process, there remain few examples of stakeholder participation in European research on fisheries. The work funded by the Fisheries Science Partnership is the only large exception. Within ICES there is little direct engagement with fishers in respect to scientific activities. An ICES/NSCFP Study Group on the Incorporation of Additional Information from the Fishing Industry into Fish Stock Assessments met from 2005 to 2008 was not successful in finding systematic ways to bring fishers into the stock assessment process. It did recommend improvements to an ICES in the

delivery of advice and called for an increase in collaborative research and in regional cooperative initiatives focused on particular stocks. Some fisheries stakeholders express the opinion that it appears that scientists are only interested in the data, not the knowledge that underpins it.

Structural connections among the various sections of DG Research and DG Mare that facilitate research on governance and science of fisheries and the marine environment can be poor, making it challenging to link science with the policies designed to make a difference to European society. For example, to avoid any duplication with research commissioned by DG Research under the 7th Framework Programme, DG Mare will not provide research funding for stakeholder bodies like RACs, despite this being the obvious route to the RACs because of the direct relevance to the CFP. This was not always the case, and even though there are good reasons for this, the outcome is that stakeholders are confused about how and where they can get involved. One exception is the funding by DG Mare of the Joint Data Collection programme (value 1 million Euros) that has enabled a few (<5) small projects, where scientists and stakeholders collaborate directly on developing self-sampling schemes that support the needs of the Data Collection Regulations. An aim of the programme is to enable participation of stakeholders in a way that is aligned with the objectives of RACs.

The structure of the EU Framework system for tendering for research projects can be seen by stakeholders as daunting; it having been described as “*like hitting a wall*”. The system is complex indeed, requiring a thorough understanding of the programmes, funding schemes, eligibility, proposal and evaluation processes; not to mention the contractual obligations of running a project if successful. Stakeholder organisations simply do not (yet) have the capacity to instigate and lead proposals, which means their involvement is often as an external collaborator. Rarely are they official project partners. Funding for cooperative research processes is no easier to obtain, but is helpful in enabling development of the capacity to engage. However, putting ‘new’ capacity to work is not straightforward, because such programmes do not generally support research activities. A disconnect thus arises between talking and doing; one that results in a loss of momentum and enthusiasm.

Not all of the blame for disconnections should be levelled at the commission. Many research projects fail to deliver outcomes in a form that policy makers can absorb and use. Indeed, the commission has had to instigate specific projects that take stock of the outputs of research projects in an effort to render them useful to policy and management. The EU’s Marine and Maritime Research Strategy hopes to tackle some of the issues by creating a better integration between marine and maritime research [18]. The research strategy provides a good foundation to support the participation of stakeholders in research.

Funding instruments play an important role in promoting and organising the capacity of stakeholders to operate effectively in European research. The principal research funding instruments such as Collaborative Projects and Networks of Excellence are not well suited to facilitating stakeholder participation. Specific instruments intended to increase an uptake of stakeholder participation, such as schemes for the Benefit of Specific Groups (BSG) (such as Small Medium Enterprises (SMEs) or Civil Society Organisations (CSOs)) have had some success on a relatively small scale (so far). For example, in the CoralFish project, one partner is a small fishing company. World Wide Fund (WWF for Nature) is leading one project that is currently under negotiation under the new BSG-CSO funding scheme. Such schemes do not however, align particularly well the constitution of the RACs (the principal stakeholder bodies in fisheries); questions remain over the definition of RACs and CSOs and how flexibly this is interpreted

and applied by the evaluators and officers of EU projects. The question of whether or not RACs are an authentic CSO is legitimate because they are currently constrained to give two thirds of their seats to organisations representing the fishing industry. Furthermore, because other funding instruments are better suited and easier for stakeholders to obtain, they are more likely to be pursued. For example, the European Fisheries Fund is a structural tool of the CFP that is well suited to technological work, but less appropriate for promoting and facilitating knowledge centred research.

3.3.2. *The role of ICES in facilitating participatory research and connecting with policy*

ICES is the principal mouthpiece for advice on European fisheries, and as such it makes sense that ICES should be involved in developing the structures that promote and enable high quality science from participatory research and translating it to management advice. However, an ICES input in this arena has been noticeable by its absence. The main input has come via the ICES study group on the Incorporation of Additional Information from the Fishing Industry into Fish Stock Assessments (SGFI) [19] and its support of the North Sea Stock Survey (developed by the North Sea Fisheries Partnership—the precursor to the North Sea RAC), which involves fishers in a semi-quantitative assessment of trends in North Sea fish stocks. This information is made available to each stock assessment working group. As the time series develops, it will be possible to use it in a more formal way, but for the most part the results are used as a point of discussion and context to understand the assessment results. In fisheries, an ICES has its closest link to DG Mare and certainly the work of an ICES has an influence over DG Mare fisheries policies. Thus it seems even more important that an ICES plays a stronger role in enabling participatory research. Benefits would also be achieved by improved dialogue and stronger cross thematic links between an ICES and sections DG Research (e.g. environment) that commission research on marine environmental issues of indirect relevance to fisheries (e.g. renewable energy). One of the outcomes of this would be better uptake and application of the science.

3.3.3. *The role of the regional advisory councils*

Despite the logical connection between the CFP and expectations for involving RACs in research, RACs experience many difficulties that make it extremely challenging for them to do so. The demands for inputs on the diverse topics that directly and indirectly (e.g. wind farm, aggregates and oil) affect fisheries consumes the time of members, each of whom have many other representative hats and responsibilities. RACs have no budget for scientific advice. RACs that wish to approach an ICES for advice are currently required do so through the Commission. Alternatively they could approach a Member State institute directly, but this raises questions of independence. Furthermore, RACs have not yet developed the administrative capacity to initiate research projects that may be of direct interest to them, and in fact it is unclear, i.e. different RAC administrations have different interpretations, whether or not their current authorization allows outside funds. In any case, doing so would require specialist expertise, since the knowledge required to access and manage such funds is a profession in its own right. The result is that the high pace of business and under-capacity stifles a genuine will to engage effectively.

It is however, early days for most of the RACs and given time to reflect and plan, a more strategic culture and direction is likely to emerge. What this will mean for stakeholder participation in research is not clear, but most likely the RACs will play a lead role

in identifying and prioritising (and perhaps commissioning) research that satisfies their strategic objectives (in-line with CFP). With the review of the CFP, such strategic plans will be essential to define their role and influence on future research and management. The legitimate question remains: would enabling

their research capacity make a difference to outcomes of European fisheries Policy? The PROFET POLICY project is an example, where stakeholder organisations were given the opportunity to help develop strategic thinking on European research and policies. <http://www.profetpolicy.info/>

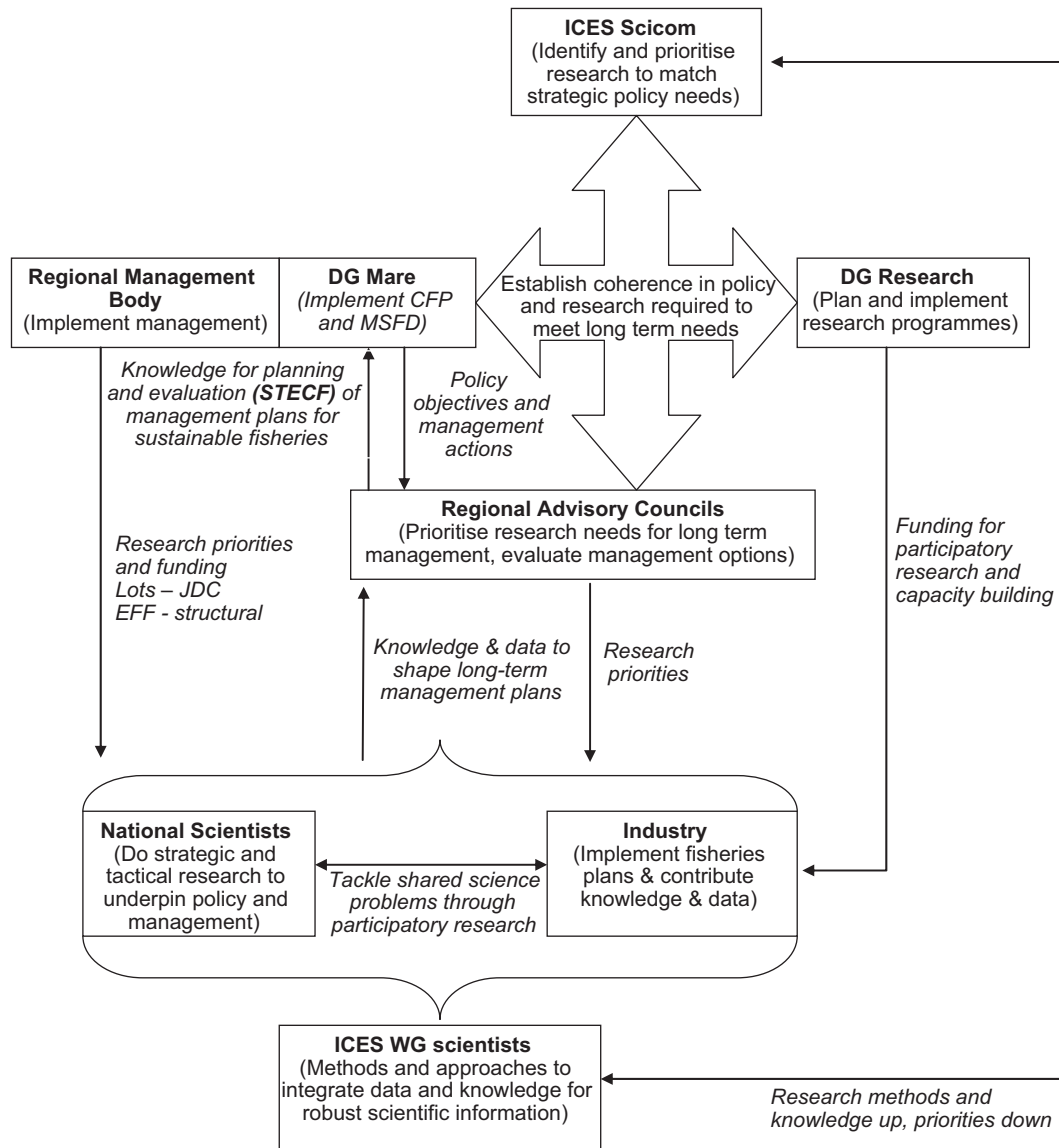


Fig. 1. Framework for enabling participation in research and governance of fisheries and the marine environment.

Extended legend:

Stakeholders: Role: implement fisheries, contribute knowledge and data to support long-term sustainability of fisheries. Needs: information on stocks, ecosystem and fisheries.

Scientists: Role: scientific knowledge as the basis of sustainable fisheries. Needs: data, knowledge, methodologies.

Regional Advisory Council: Role: identify and prioritise research needs that match policy (CFP and MSFD); use research to develop long-term management plans; interpretation and evaluation of policy objectives and management actions; influencing policy by translation and communication of the outcomes of shared research actions. Needs: scientific information to support interpretation and evaluation; funding to enable capacity to fulfil role.

ICES: Role: scicom aligns priorities with CFP and MSFD, WGs provide methods and approaches that integrate data and knowledge to provide robust scientific evidence at the EU level. Needs: policy awareness, information to develop European science applications, appropriate representation of scientists.

DG Mare: Role: structure and delivery of integrated marine and maritime policy through CFP and MSFD. Needs: scientific information (in useable form) on fisheries and environment via clear connection to DG Research; knowledge for the planning and evaluation of management plans towards sustainable fisheries.

STEFCF: Role: scientific evaluation of robustness and implementation of alternative management actions. Needs: management plans and data (biological, economic, social) to evaluate plans robustness and impacts.

Regional Management Body: Role: implement EU management strategies through regional management plans. Needs: scientific basis for management plans, specific to each region. Societal management objectives.

DG Research: Role: developing capacity for a governance system capable of defining and enabling European policy; developing the research structures and knowledge required to support policy and management of marine environment. Needs: quality research that connects with society and provides the scientific evidence to support management at a strategic and tactical level.

Funding: lots—Joint Data Collection (JDC). Funding from DG Research to facilitate collection of fisheries data by fishers in support of the CFP. EFF—European Fisheries Fund. Structural funds to promote implementation of CFP – not typically designed for funding research.

4. Moving forward: priorities and a framework for improving the participation of stakeholders in research based on existing structures

4.1. Strategic priorities for enabling participatory research

Participation in research is not a one size fits all process. There are many different levels on which stakeholders can participate, and are happy to participate. Opportunities need to be available at each level so that not a single opportunity is lost. Moving forward requires motivation and enthusiasm to succeed, combined with a strategy to demonstrate the impact and value of doing participatory research. Important strategic priorities for taking forward participatory research on fisheries and the marine environment are:

Make the link to governance—the connection between how research influences management, the impacts upon and response of society is wedded to the governance system. Making clear the role that stakeholders play in the governance system legitimises their role in research.

Make a difference—ensure the process has a positive effect on the relationship between fisheries stakeholders, scientists and policy makers. The contribution by stakeholders must make a real difference to the rigour of scientific advice, meet the needs of specific situations and must be recognised by high-level policy makers, otherwise efforts will continue to be undermined by stakeholders' mistrust of the use of science in decision-making.

Effective communication—promote attitudes that facilitate collaboration in solving problems and effectively communicate the value of participatory research to high-level policy makers in a measured and realistic way, otherwise expectations will be too high and will fail to deliver.

Make the changes sustainable—build the administrative and logistical capacity to enable stakeholders to participate effectively in research over the long-term. Local successes are good, but longer term sustainability relies on scaling up from a regional to an international level.

Create opportunities—develop strategic alliances and influence National and European research policies in a clear and persuasive manner so that appropriate opportunities for further development are created. Work with relevant policy issues, structures and timescales in mind, so that research has the best chance of making a difference.

Maintain momentum—apply coherent and continuous effort at all levels, because enabling effective participation by stakeholders is a long-term process and sufficient momentum needs to be developed to avoid derailment by short-term political attention cycles.

Evaluate—focus on the evaluation of the participation process, not just the scientific outcomes, and learn from the experience to ensure the full promise of participation in research is realised. A system of feedback requires evaluation and reflection on whether science has met defined needs. Are any outcomes arising from collaborative processes achieving the desired effect? Are policies easier to implement? How is compliance? What are the views of stakeholders, scientists and policy makers? Feedback is critical to assess if participatory research processes are working. The easiest route to this is to ensure work is open and transparent throughout.

4.2. Framework for enabling participation, the research and governance of fisheries and the marine environment

A framework that describes a structure for the flow of information and knowledge in a way that promotes intensified knowledge-brokering among policy makers, scientists and stakeholders, is proposed in Fig. 1. Its purpose is to help shape and deliver successful evidence-based policies by connecting existing

research, management and governance structures, while taking account of emerging needs. In particular, it takes account of the aspirations of the new CFP to challenge the view that public policies are top-down controlled and create a stronger role for stakeholders in management. It takes account of pressing need and ongoing initiatives to integrate marine research and governance. The role and needs of each 'component' are elaborated in more detail in the extended legend. Numerous questions were raised during thinking about the framework, and we do not pretend to kid ourselves about the gap between conception and realisation of an idea. Nonetheless, it is important to aspire to improve and adapt the system so that it meets the needs of an effective governance.

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