Lost in translation: Differences in role identities between fisheries scientists and managers

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Abstract

In the European Union, fisheries managers rely on the expertise of scientists to provide scientific advice for the fisheries management process. Yet the boundary between science and policy is not only imprecise, but one that is also socially constructed. Negotiations take place between two main groups, managers and scientists, surrounding the roles and expectations each has towards the other. Pressure is placed upon each group to conform to the role expectations of the other. Taking note of reform attempts of the European fisheries management system which are already under way, we suggest that reform must provide for effective two-way communication between scientists and managers, which recognises their different needs and role identities, and focuses on both areas of conflict and areas of common interest, in order that the system better meets the requirements of each party, ultimately aiding in the shared goal of the sustainable use of fisheries resources.

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Abbreviations: ACFM, Advisory Council for Fisheries Management at ICES; CFP, The Common Fisheries Policy; Commission, Short for European Commission; COREPER, The Committee of Permanent Representatives COREPER to the European Union. Members include EU State highest Civil servants; Prepares Council meetings, including the agendas, deciding which issues go to Council, and monitors legislative working groups; DG FISH, Directorate General for Fisheries and Maritime Affairs; European Commission, The executive branch of the European Union; ICES, The International Council for the Exploration of the Sea; STECF, The Scientific, Technical and Economic Committee for Fisheries, of the European Commission; TAC, Total Allowable Catch

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1. Introduction

Fisheries in the EU have been managed under the Common Fisheries Policy since 1983. Under this arrangement, fisheries managers in the EU Commission work with and rely on the expertise of scientists at the International Council for the Exploration of the Sea (ICES) and the EU's own Scientific, Technical and Economic Committee on Fisheries (STECF), as they prepare fisheries policy advice for the Council of Ministers each year. Despite this longstanding, productive relationship, however, dialogue between scientists and managers is often characterised by frustration and conflict, which has become particularly acute in the context of dwindling fish stocks in certain regions. Termed by Wilson and Hegland as “anomie”, this bleak outlook can be attributed to divergent role identities between the two groups, which create needs and expectations on both sides that cannot be fulfilled [1]. The purpose of this paper is to explore how these role identities are established by the enculturation of scientists and managers into discrete subcultures, operating under specific institutional constraints. By identifying the nature of these role identities, it is possible to observe why they come into conflict and how this might be reconciled to improve communication and co-operation, and thus enhance the performance of fisheries management.

Role identities refer to the perception an individual or group holds towards their responsibilities and area of competence—their place, or role, in the wider social and institutional system with which they identify. In European fisheries management, as in many other arenas, individuals and groups are subject to multiple and distinct cultural influences (see Fig. 1). Each of these “cultural spheres” also embody certain institutional constraints determined in both formal mandates and informal conventions. Role identities can thus be seen as the shared understandings and beliefs that emerge from this dynamic

Fig. 1. The construction of role identities in fisheries management.

interaction of cultural and institutional spheres. These identities are subsequently reflected in the needs and expectations that both scientists and managers have from the process of fisheries management. In short, therefore, we suggest that to explain the contrasting role identities, needs, and expectations of the two groups, it is necessary to examine the differences in shared cultural understandings and institutional constraints.

The frustrations and disillusionment experienced by scientists within the European fisheries management process has been explored in considerable detail elsewhere [1]. In this paper, we seek to compare and contrast this with the perspective of managers, exploring how the pressures placed on scientists in fact stem from the role identities and expectations of the fisheries managers. While our paper explores the roles of scientists, this is considered solely vis-à-vis the role concepts of fisheries managers. We also seek to examine the impacts that the conflicting identities and expectations of the two groups have on managers. Our findings suggest that the current assessment process is equally unsatisfying for both parties, and propose that it is only through effective two-way communication between scientists and managers, which recognises their different needs and role identities, and focuses on both areas of conflict and areas of common interest, that the system may be reformed to better meet the requirements of each party.

This paper begins by outlining different concepts that can be useful in interpreting institutional constraints, cultural understandings, needs and expectations. Second, we identify the methods used in the research. Following this, ethnographic vignettes open the analysis section and the discussion of fisheries managers' and scientists' role identities. The paper concludes with discussion on the common ground shared by the two groups and issues relevant to the reform of the fisheries management system.

2. Useful concepts for analysis

2.1. *Cultural understandings*

Though there is no single, agreed-upon definition of culture, in this paper, culture is defined as a system of shared beliefs, values, customs, behaviours, and artifacts that members of society use to interpret their world and their relationships with one another, which are transmitted from one to another through learning [2,3]. A subculture is a small cultural group within a larger culture which shares some, but not all, attributes with other subcultures. Through the enculturation process which takes place as members enter these subcultures, individuals come to share an understanding of their role identity.

As shown in Fig. 1, fisheries scientists and managers can be understood as two distinct subcultures sharing the dominant culture of European fisheries management. Both groups are also subject to influences from outside of this dominant culture, with scientists influenced by the culture of "science" and managers by the culture of "bureaucracy". Each of these cultures provides a unique identity, characterised by its shared understandings of concepts, roles and needs or interests, and its institutional context. Within a subculture (e.g. fisheries managers), these separate identities are fused to create a unique and distinctive set of attitudes, values, and behaviours that differ in varying degrees from the dominant cultures (such as European culture) and parallel subcultures (such as fisheries scientists). One aspect of this subculture is the shared understandings of the groups' own responsibilities and their expectations of others in the system (i.e. their role identities).

2.2. Institutional constraints

An analysis of institutional constraints will strengthen the analysis because, as Wilson [4 p.492] points out, “... institutional explanations focus on how the structure of interactions blocks or distorts communications that otherwise might be understood”. Cultural understandings and role identities can thus also shape, and be shaped by, institutional constraints faced by the individual or group. These may take the form of legal documents and formal objectives that directly determine the roles and responsibilities of a group. Alternatively, they may be more indirect, generating certain needs within the group which influence the shared understandings of their role. Institutional constraints in fisheries management primarily relate to the way in which the assessment process is organised; the position of the group within the fisheries management process, their internal composition, and their legal mission/terms of reference. Institutional constraints not only determine the roles managers and scientists identify with themselves, but also the roles they attribute to each other (i.e. their expectations).

One concept that can be useful in interpreting institutional constraints in the context of scientific assessments relates to whether an organisation is autonomous or embedded in the policy-making arena [5]. Autonomous processes are those where the scientific advisory organisation is separate from the political institution that they provide advice for, while embedded processes are those where the advisory organisation is contained within the policy-making apparatus itself. Firmly separated from the policy-making institution, autonomous organisations are expected to have more independence (in terms of merit-based appointments and scientific control of the research agenda) and hence less involvement between scientists and policymakers (in terms of communication and formulating advice), and vice versa for embedded organisations [5–7]. In Fig. 2 we demonstrate how these distinctions can be applied to the institutions involved in European fisheries management. While these distinctions may not always hold true, the core point to note is that whether an advisory process is autonomous or embedded can influence the *expectations* that both scientists and managers have of their respective roles within the process.

Fig. 2. Autonomy *v.* Involvement in scientific assessments.

2.3. Needs and expectations

The needs and expectations of scientists and managers, we suggest, stem from the cultural understandings and institutional constraints under which they operate. While they may share the same broad aims inherent to European fisheries management, each party has different interests they seek to fulfil in the management process. Recent work in the field of environmental scientific assessment identifies three key needs that groups (i.e. decision-makers, resource-users, environmentalists or scientists) seek to fulfil in the assessment process. These are termed salience, credibility and legitimacy. Salience refers to the extent to which the assessment is relevant, addresses key problems and provides recommendations that can be effectively implemented within the current policy environment. Credibility refers to the scientific credentials of the assessment, particularly based on the perception of whether producers of knowledge have expertise, trust that producers' interests or biases do not drive knowledge creation, and the idea that the scientific assessment represents a consensual agreement among scientists.¹ Legitimacy refers to the extent to which the procedures of the assessment for creating knowledge and agreement are perceived as fair, and whether the concerns of all parties are represented and considered [8–11].

Cash et al. [10] note that different audiences (i.e. scientists, decision-makers and stakeholders) perceive these three concepts in different ways, and so an assessment must balance the needs of the different groups. While some actors may prioritise a single need above others, each actor has certain thresholds of all three: salience, credibility and legitimacy, that must be met. These concepts are not independent, and trade-offs must be made — for example, limiting involvement in the project to top scientists may enhance credibility (particularly among other scientists), but could undermine salience by failing to address concerns of decision-makers (as a lack of participation means they have been unable to influence the agenda of the research). Where assessments fail to achieve an appropriate balance of these needs, it is argued that they will fail to be influential in the policymaking process [5,7–10]).

The above discussion has hopefully illustrated how we might understand role identities in terms of needs and expectations, with reference to both shared cultural understandings and institutional constraints. In the analysis section, we explore the content of these influences among fisheries managers and scientists in more detail, using evidence from our interviews to show the importance of each component in role identity acquisition. The analysis begins with a series of vignettes describing the scientific input into the management process in order to set the scene for the interaction of scientists and managers. We then move onto consider the perspectives of fisheries managers and scientists in turn, laying out their shared cultural understandings and the institutional context in which they operate.

3. Methods

We approach the topic of role identities from both an anthropological and institutional perspective. Research for this paper was conducted over an 18 month period from

¹While the accuracy of the extent to which science adheres to these ideals is questioned by constructivists, they remain important characteristics for many observers against which scientific assessments are measured.

April 2003–November 2004, using qualitative social science methods. Methodology included interviewing, participant observation, and analysis of textual documents.

Semi-structured interviews took place with fisheries scientists and managers who work on demersal fisheries, especially cod, in the North Sea. Following anthropological terminology, semi-structured interviews are those interviews which are undertaken with a questionnaire schedule. On the scientist-side, scientists from the UK, Denmark, and Germany were interviewed. On the manager-side, interviews took place with national (Denmark, Norway, and the UK) and Commission (DG Fisheries) fisheries managers. One COREPER representative was also interviewed.

Participant observation took place at two working group meetings, two ACFM plenary meetings, and two STECF (Scientific, Technical, and Economic Committee for Fisheries, a European Commission group) plenary meetings. Participant observation remains a key method in anthropology for uncovering cultural rules and emic² perspectives. In this study, the method proved especially invaluable for providing the scientists' worldview, way of working, and perceptions of roles. Close attention was paid to the language and words used, as these symbols are keys to providing the insider perspective of participants in the culture.

Analysis of textual documentation, including interview transcripts was undertaken with the aid of data analysis software, QSR (aka NUD*IST). Thematic analysis is conducted with this tool.

The choice of conducting research with individuals who work with cod was a strategic one. Cod, in the words of one manager, "is quite an extreme example". Yet, just such an example is useful as it throws into relief the scientific problems of a single stock, in a mixed fishery, with high political stakes. All the problems involved in the reform of the CFP are embodied in this one stock, cod. Consequently, to understand the issues involved in fisheries management in the European Union, an example which is extreme best highlights the issues involved.

4. Analysis

4.1. *Setting the scene: ethnographic vignettes*

The process of fisheries management in the EU is shown in Fig. 3. To begin the analysis, two ethnographic vignettes outline the meetings held by scientists in order to develop the advice, first in an ICES working group and then subsequently at the STECF, in which at least one management representative is in attendance. These vignettes will highlight key cultural traits or symbols, necessary for better understanding the world of fisheries management. This provides a useful window into the process of advice creation, and the pressures and requirements placed on scientists. In the vignettes and subsequent discussion, most of the scientists work in national institutions, holding part-time positions in ICES, the STECF, or both, with only a few key individuals in ICES who work full-time. Most of the fisheries managers under discussion in this paper work in the European Commission in Brussels, though some work in national ministries in Denmark and the UK. All of them travel for their work, sometimes to ICES (The International Council for the Exploration of the Sea); other times to special management meetings and subgroup, working group, or State level discussions.

²emic is defined as insider. In this analysis, the meaning of cultural traits and patterns is assigned on the basis of the informants' perspective within the internal meaning system of their culture.

Fig. 3. Flow of decision-making in EU fisheries (Hegland [17]).

4.1.1. Spring 2003, Copenhagen, denmark

In the small conference room on the top floor of ICES headquarters a small *working group* meeting is taking place in a narrow room with long tables set up down the length, and tall windows nearly reaching the ceiling. The weather is unusually warm for this time of year, though the windows are kept closed in an attempt to keep out the deafening pounding of road construction. Nine people are sitting around a table. They are supposed to discuss two economically and culturally important fish stocks, though with the time given to them on this particular day, they only discuss one: Cod. Eight of the people around the table are fisheries scientists or technicians; one is a fishery manager attending the group as an observer. Two are women, the rest are men.

The fisheries scientists begin discussing their *ToRs* for the meeting and decide to first review the presentation from the draft of a working group report and then review their draft — all in a mere 4 hours; the presenter, however, had only first looked at the draft report 15 minutes previously. The *ToRs* cover a variety of topics concerning cod, such as reviewing new information for stocks in the Irish Sea and recovery measures for cod in the North Sea. The scientists' discussion centres on how little information they have, how unwilling they are to make a *medium term projection* and how they think the *forecasting* is unreliable. Furthermore, the scientists feel the risks managers are taking with the stock are higher than appropriate. As the day progresses, the discussion becomes more intense:

The scientists comment how they are unable to make predictions for the recovery plan. The fisheries manager observer points out his concern with the way things are

going, ...it's looks like advice, but then you give a little caveat which says you can't really say and then it undermines the whole thing. The scientists continue talking about ways to work around this — such as taking an *adaptive approach*. The fisheries manager voices his concerns again in strong tones, and worries about conflicting advice and the results in *October*. In 2002, it was 36 000 tons and advised a closure, but now in 2003 find yourself with 18 000 t but don't advise a closure. Later, the fisheries manager tries to bring them back to another issue, not of numbers but of whether the scientists are able to support a closure of the fishery.

Despite disagreements, discussion takes place with an informal air; participants call each other by their first name and speak up when they desire. At several points, they make jokes at the expense of the *Commission*. While this is on-going, the fisheries manager is taking phone calls from his counterpart at the Commission. He emphasises to the scientists at one point following such an exchange on his mobile that a *non-response* to one of the ToRs is not an option.

This scene closes and another opens, this time in:

4.1.2. *Brussels, Belgium, November 2003*

Since the working group meeting described above, scientists have discussed cod issues at least three times: during the ICES Working group for North Sea /Skagerrak (WGNSSK), the ACFM plenary meeting, and an STECF working group. The information will now be re-visited at the STECF plenary. The STECF is holding its plenary meeting in a large Commission building meant for these types of meetings. Once visitors pass through security, they are allowed to ride up the escalators until they reach their designated floor. Meeting rooms are held off a small lobby with computers and tables with ashtrays. The fisheries scientists slowly trickle into their assigned room. Most settle in a chair by the main set up of tables, made into a “□” shape. Interpreters can be seen behind in glass booths, unpacking books and talking with one another. Scientists sit with members of their own *delegation*. People walk around greeting each other with a smile and a handshake. A Commission representative is seen talking with the acting chair. He is overheard to say, “*And that's part of the problem; most of these people are also in ICES*”. When the meeting begins, the acting chair welcomes everyone and outlines the planned activities for the week. The Commission representative then addresses the group with a welcome and a plan for the future; he says most of the demersal stocks are in trouble; they know this and want to move to mixed fisheries — looking to the scientists on where to start. Simultaneous interpretation is provided via headphones for those not comfortable in English.

Later in the day, STECF members break up into *subgroups*; most of the economists will be in a subgroup of their own during the week, though one economist represents them briefly during the biologists' discussions being observed. In this subgroup, the scientists are discussing the results from the very first working group meeting held at ICES in May. In the May meeting, the scientists were discussing *numbers* and were concerned about how these numbers would be used.

Scientist One: Another part of the advice is what catch would be consistent with the Recovery Plan. Scientist Two: we should ignore that. If the Commission wants to do the numbers then let them to the numbers. Scientist Three: also a worry if any calculations will be an endorsement, we have not done some for the fear this would be taken such. But calculations do not mean an endorsement; we have to go to the

North Sea working group to get numbers; not even sure if we need to do this as a part of this advice.

In this STECF subgroup, the scientists visit this advice along with the advice from the ACFM report.

As the scientists walk into the stock assessment subgroup one jokes about inconsistency in ICES advice, “*ICES has gone mad*” referring to cod advice. They then begin the session discussing Plaice. Scientist One: I wonder why the report refers to “projections” when there were no projections provided by ACFM? This is classic ACFM. They’re telling us they did something they didn’t do. Why? Scientist Two: They didn’t want to put a number in. Scientist Three: normally they would put in a percentage. Scientist One: so it’s relative? Scientist Four: yeah, that would be helpful. Scientist Three: These sorts of things are important. It indicates a direction of change. [It’s] Helpful. Scientist Five: But they said all medium projections are optimistic. Scientist Three: That’s my point. If the medium term is overly optimistic and they still don’t achieve a recovery then that is helpful [to know].

The scientists will discuss their ToRs and advice in this manner over the next four days, finding a balance between supporting their ICES colleagues as much as possible, and meeting the needs of the Commission. The end result is a report given to the European Commission (DG Fisheries). The advice in this report will be taken by the Commission and used in the Council of Ministers for the setting of TACs for all Member States of the European Union.

4.2. *Role identities of managers and scientists*

In a number of respects, scientists and managers have a common starting point in the creation of role identities. They have knowledge and experience of working with the same institutions, and share understandings of many aspects of their cultural world. They each know and agree, for example, on:

- what *ICES* is—the International Council for the Exploration of the Sea;
- what a *working group* is and its purpose — the generation of scientific advice, in this case stock assessments, by fisheries scientists and technicians, to be used in recommendations (eventually) to the Council of Ministers;
- what *ToRs* are — Terms of References, the questions and requests that guide the work of group members.

But scientists and managers do NOT share the same understanding of everything in their world. They do not, for example, agree completely on *advice*. Advice is the packaging of scientific information for managers to use when providing recommendations to the Council of Ministers. And though the two groups agree that managers need the advice presented by scientists, they do not agree on what exactly the advice should be, on what *form* the advice should take. This is an example where, on the surface shared understanding appears to exist, but in reality, such understandings diverge between the two groups.

One reason for this divergence is the different cultural influences acting on managers and scientists. As noted earlier, subcultures are the product of a fusion of different cultural influences, so while they may share the dominant culture of European fisheries management, they are also likely to show considerable differences in understanding. In addition, while they may have experience of working with the same institutions, their positions in this context differ considerably. In the next section, we explore the differences between managers' and scientists' understandings as to their respective roles in the advisory process, and the extent to which these expectations are realised.

4.2.1. Fisheries managers

4.2.1.1. Cultural understandings of role identities. In the case of managers, the culture of the bureaucrat takes precedence over other qualifying situations, including cases in which individuals came from a background in science before coming to the management side. As bureaucrats their primary responsibility is the implementation of scientific recommendations into workable policy proposals. In the fisheries management system, their job is “to manage fisheries”, taking scientific advice and translating it into management proposals, usually involving a quota for total allowable catch (TAC). For this, they need advice to be salient, i.e. relevant and directly applicable to the current political environment.

It is widely believed among fisheries managers that scientists have failed to provide the kind of advice that is expected of them, in order to allow managers to fulfil their role. Specifically, the scientists are seen as providing “pure” science, which is not relevant to making policy proposals, rather than more useful, “applied” science. Managers expect scientists to show some awareness of issues of technical implementation, standard procedure and political constraints, which they feel should be reflected in recommendations that are compatible with the existing political situation. These opinions were clearly evident in our interviews.

Scientists don't pay attention to the complexity of the management process ... there are big discrepancies between what scientists would like to do and what managers need in terms of knowledge. What they would love to do is not necessarily what managers need (Fisheries Manager, 2004³).

We now have a harvest rule, but with no input to it, so we are not actually in a position to apply these formulae, because we simply do not have the scientific advice. ... there is very little, if any, help from ICES for the scientific advice. They just say the TAC should be zero. No fishing. When this is not a political option, you have to do something else (Fisheries Manager, 2004).

Scientists do not invest enough in understanding the machinery and how the advice can contribute to the machinery. They think that... “oh the machinery is not going well because my advice has to be followed”. First off then they tend to produce science which is not relevant to a large extent (Fisheries Manager, 2004).

³The majority of interviews with managers took place in 2004. Given the limited number of managers interviewed, and the need for anonymity, further details are not provided.

Particular problems cited by managers were in cases where the data available for making predictions is limited, and advice demonstrates a low level of confidence. The status of cod stocks in the North Sea is a prime example of this problem. In addition to being part of a mixed fishery, even single-stock assessments of abundance are considered by ICES to be impossible given the extent of misreporting of landings and discards. One manager summarises the problem:

They [scientists in ICES] are not in a position to make any forecast. But, on the other hand, they are convinced that the stock is in a very bad shape. So the only advice they can give us, if we are to live up to our own management plan, that is to stop fishing. But they give us no options here because of the uncertainty on these assessments, they would not give them to us, they are developed in the ICES working group by ACFM, they will not take the responsibility. And they do not believe in these calculations, or they are so uncertain that they simply can not endorse them (Fisheries Manager, 2004).

In these situations, managers expect scientists to provide a “best guess”, with an estimate of the level of uncertainty, in order that they have some basis for their policy proposals. Recent changes to management practices, such as the introduction of harvest control rules, increases the pressure on the Commission to use scientifically justified figures.

They must give us options, no matter what the data situation (Fisheries Manager, 2004).

up until 2003 you had lots of these statements [in the ACFM Report] where ICES advice recommended that ‘the fishing mortality to reduce is correspondent to the TAC of that next year, however this is probably biased so you should take account of that for management.’ ... such advice as that is ‘covering your ass’ and basically that is what they are doing. They tell you, ‘this is our advice, we do not believe in it, so we had better tell you there is a problem with it’ but they don’t tell you what else to do (Fisheries Manager, 2004).

One fisheries manager highlights a central problem in the inability of scientists to appreciate the significance attached to certain terms by managers:

Now ICES has changed because of the pressure from Norway, they have changed their terminology so they do not use the word “safe biological limits” any more, and that gives us problems because all our regulations use this phrase “assessed by ICES to be within safe biological limits”, and again this is illustrative for us that they do not really know how scientific advice is used (Fisheries Manager, 2004).

The significance of definitions is an important aspect of the culture of bureaucracy, where terms such as “safe biological limits” are explicitly referred to in legal documents and are essential for managers to ensure a consistent approach is applied.

As bureaucrats, managers must seek to balance interests and weigh up risks of different courses of action. For this, managers not only need advice to be salient, but also seek to understand the rationale of advice, and must trust that the interests of scientists do not drive knowledge creation (i.e. it must be credible). In this respect, transparency is vital for managers; assumptions must be made clear and the advice-giving process to be open to

review by outside experts. This allows advice to be translated into management measures more appropriately — for example allowing managers to make a “best guess” based on all available data where the level of uncertainty prohibits a formal quantitative assessment. Transparent advice would be easier to translate into management, i.e. it would meet the need for salience. In addition, it is felt that transparency will allow managers to identify where the quality of data needs to be improved:

It must be very clear to managers which is the rock solid and reliable advice and which is an expert based opinion based on something or other. And I think we should be able to find out where we have a strong system and where we have a weak system, because only then can we actually look at the weaker parts and say ‘what do we do about this?’ (Fisheries Manager, 2004).

However, there is a general feeling that the assumptions and uncertainty contained within an assessment are not open to review. In the words of one Commission manager:

I also think they should be much more transparent in the way that they present their options. What are the assumptions? And what is the uncertainty behind these assumptions? And they don’t do that. Because they are very worried that we will start discussing these assumptions. So they try to limit the information as much as possible so administrators have very few parameters to discuss really. So in a way we are guided very much in our discussions and there is not very much room for having a full-fledged dialogue on all these parameters which are so important for the assessment. I don’t think the scientists have trust in the administrators that we would be able to manage all this in a proper way. On the other hand, we feel a little bit manipulated because sometimes you just find a few figures and the recommendation and you don’t have answers on all your questions and why and how and what are the assumptions about this and that (Fisheries Manager, 2004).

As the extract above indicates, this manager feels “manipulated” by the scientists, who are considered to be going beyond their role of simply providing advice. One specific issue relating to transparency is the use of the precautionary approach in scientific advice, which places the scientists in the role of decision-makers in setting an appropriate level of risk, which is seen as a “political” decision (Wilson and Degnbol [12]).

4.2.1.2. Institutional constraints. The shared understandings managers possess about their roles and expectations of others to some extent both stem from, and are cemented by, institutional factors. These include their position within the system as well as documents and processes that outline their respective responsibilities. Fig. 3 shows the position of various actors within the EU Common Fisheries Policy:

For groups falling under the remit of the EU (the Commission, the STECF and the Regional Advisory Councils), their roles and responsibilities are defined in EU regulations. The position of managers in DG Fisheries within the fisheries management process is shown in Fig. 3. Under the Common Fisheries Policy regulation, the Commission is required to “formulate and propose measures for the conservation and management of fisheries resources to ensure their sustainable exploitation.” In addition, it has a key role in the control and enforcement of measures agreed under the CFP.

In terms of using scientific advice, the Commission’s (DG Fish) role can be understood as that of an interpreter, taking the advice from ACFM and translating it into

recommendations for management measures to be decided on by the Agriculture and Fisheries Council. The CFP regulations include only limited details as to this expected role of the Commission. However, by necessity, proposals must be in line with the general objectives of the CFP, and this gives an idea of the institutional constraints acting on the conception of the role identity. The Council Regulation reforming the CFP sets out the objectives in Article 4:

The objective of the Common Fisheries Policy should therefore be to provide for sustainable exploitation of living aquatic resources and of aquaculture in the context of sustainable development, taking account of the environmental, economic and social aspects in a balanced manner [13].

In addition, the regulation requires that the Commission take account of “biological, economic, environmental, social and technical considerations,” that are explored in the advice from the STECF, and provides the capacity for stakeholder participation in the RACs (which the Commission may consult). Thus the Commission acts as a mediator between the advice from the scientists in STECF (which acts primarily as a review mechanism for advice from ICES, in addition to performing other analyses such as the Economic Interpretation of ACFM Advice, or EIAA), stakeholders and the Council, formulating management measures.

The recent Commission communication on scientific advice describes the responsibilities of managers in more detail:

Under the proposed new Framework Regulation governing the operation of the common fisheries policy, the Commission will continue to be responsible for proposals for Community measures for the conservation and management of resources, conditions of access to waters and resources, structural policy and management of the capacity of the fleet, control and enforcement, aquaculture, common organisation of the markets, and international relations. In particular, there is an obligation to put in place a decision-making process based on sound scientific advice and delivering timely results. Because of the Commission’s pivotal role in proposing and overseeing the execution of this policy, it is essential that it be supported by the right expertise at the right time [14], Section 3, P. 6.

The role of managers, as set out by regulations, is thus inherently political, guided by the general objectives of the Common Fisheries Policy. Scientific advice is seen as an apolitical tool for managers to perform these wide-ranging policy functions. However, there is an awareness that fundamental political decisions, such as the hierarchy of objectives, is beyond the purview of not only scientists but also the Commission members as well. One manager notes:

Should we move these stocks from producing profit, or should we use this stock for maintaining jobs in some areas? ...this should be a big political decision involving high level politicians (Fisheries Manager, 2004).

The importance of relevant advice for managers is explicitly discussed in both the recent Commission communication on scientific advice and the Memorandum of Understanding between the EU and ICES. In these documents the Commission sets out its needs for an advisory process that is transparent, responsive to urgent requests, flexible enough to be adapted to specific fisheries and that produces advice that is clear and unambiguous.

A specific need of the Commission is mixed-fishery advice, i.e. advice that is geared to management of fisheries, targeting multiple stocks and species, rather than single-stock assessments. The emphasis on responsiveness to requests and for advice to be clear, unambiguous and adaptable to specific fisheries can be seen as relating primarily to ensuring that advice responds directly to needs of managers, and can be applied within existing constraints on management.

The need for credible scientific advice is also evident in the Commission communication. Here, the Commission articulates a mainstream view of science, whereby scientists are objective and distanced from politics:

Advice should be objective and impartial, prepared in accordance with the most recent accepted scientific methods...It is essential that advice be provided to the Commission by scientists who are well-informed, of good standing, and visibly free of political influence [14], Section 3.1, p. 6.

The idea of science as free of political influence is very close to the conventional view of science that also to some extent guides the scientists' own role identities.

4.2.2. *Fisheries scientists*

4.2.2.1. *Cultural understandings of role identities.* Fisheries scientists have a different understanding of scientific advice. Their view has been influenced by the scientific culture, which has formed a key part of their background, and as such they have a clear idea of their role as *scientists*. Science seeks to understand how nature behaves by observing and correlating available factual information. Our understanding of science is therefore based upon, and limited by, the factual information available. It is the job of scientists to determine the accuracy of factual information and how it can be used to increase our knowledge of how nature behaves — in this case, fisheries stocks. It cannot be overstated how pressing having actual data is to scientists — it is THE definition of who they are and what they do. Most of the scientists observed have a background in biology and it is precisely this background in science which gives them the credentials for their job. To give advice without factual data is the antithesis of who and what they are.

Scientists have a shared sense of the need for their work to be perceived as credible among their peers, as peer recognition and acceptance is essential to generate knowledge [15]. It is this desire for credibility that influences the role they seek in the fisheries management process — i.e. to provide “science based advice”, that is objective advice on the biological aspects of fish stocks, leaving politics to the politicians. Scientists are concerned with scientific advice being credible and supported by evidence. As one scientist describes:

The priority within that process has changed in that you're not allowed to say anything unless you have the data to back it up. I mean, the classic example is missing catch data. And we can't use it. Even if we have got a good idea, because it's a number plucked out of the air, or it could be misinformation. So, I'm certainly acutely aware of trying not to say something unless I've some evidence to back it up (Fisheries Scientist, 2004).

The need for credibility means scientists worry incessantly about data quality and data being used without “the health warnings” taken into account by managers. As scientists in one stock assessment subgroup discussed during one exchange in 2003,

We're in the difficult position again ... people [meaning managers] just look at the numbers and not the health warnings. ... do three scenarios. No point in only one.

Scientists feel their role consists of science and should not drift into the realm of politics. The following exchanges were observed during a stock assessment subgroup meeting in 2003,

We need to talk about the decision weight very much here. Decision weight is what emphasis you give the target. [and] These are political decisions.

Scientist Two: The decision-weighting is a political choice, there is no biology in it.

Scientist Three: To me the biological options aren't covered in the subgroup; the key issue is small changes make large fluctuations.

In these exchanges you can see clearly the choices scientists are forced to make. While they strive for pure science, in reality they are hampered both by what managers want and need from them, as well as by the subjective nature of choices that go into running models. Scientists are driven not only by their own cultural background but also the expectations placed upon them, and their role within the management process.

As noted above, the needs that groups have regarding scientific assessments can be contradictory and may involve a trade-off, in this case, between salience and credibility. Thus for managers, for advice to be salient, scientists must include recommendations for policy even where data is limited and the confidence placed in predictions is low. However, for scientists, making recommendations in the absence of adequate data is seen as damaging to credibility. In these situations, managers are actually asking a great deal from the scientists, which goes against their whole identity. It is equally difficult for managers where scientists do not provide even a "best guess", as without the expertise and data that may be brought to bear on the problem by ICES, managers are unable to evaluate the biological implications of changes in a reliable, evidence-based manner. Managers are thus unable to play their role of translator of scientific advice to policy proposals effectively.

4.2.2.2. Institutional constraints. As with managers, the position of scientists in the fisheries management process (i.e. their level of autonomy or involvement) is an important factor in determining their role identities. It is also a key determinant of the roles managers attribute to scientists, i.e. their expectations of them. In Fig. 2 above we have sought to place the institutions involved in providing advice to be used in European fisheries management. The primary institutions serving the EU Common Fisheries Policy are ICES and the STECF. Advice may also be provided by non-governmental organisations, and reports commissioned by governments, although this is rarely provided on a regular basis.

ICES can be seen as an autonomous organisation in the sense that it has a separate institutional identity from the EU, which is just one of the clients which it provides advice for. ICES has control over the general research agenda, and coordinates the work of the national research institutions that comprise its membership. However, the funding for assessments which form the basis of this advice comes from the EU Commission itself, and as a paying client the EU has some influence over the advice that is provided, in agreements that are reached in the Memorandum of Understanding between ICES and the Commission. In this sense, while ICES may have more autonomy than the STECF, it is considerably more limited than that of NGOs. However, ICES retains control over how

the requirements set out in the MOU are met, and often chooses not to meet the requirements where they feel there is no adequate scientific basis.

The STECF is an embedded institution set up under the auspices of the Commission, tasked with providing advice to DG Fisheries, which takes the form of comments on the validity of ICES advice, and provision of assessments that ICES is unable to undertake — e.g. an economic impact analysis. The STECF does not have an identity separate from the EU, and the Commission has greater control over the research agenda of STECF than of ICES. Nevertheless, it maintains a limited degree of autonomy in that the scientists participating in the STECF do not rely solely on the EU for funding (the EU only pay for their expenses), and can act on its own initiative to provide unsolicited advice to the Commission.

As an autonomous organisation, fisheries managers acknowledge the independence of ICES and the fact that the EU is not a Member of ICES. Consequently, they *say* that it is ICES' prerogative to work and provide advice in the manner ICES sees fit. The role of scientists in ICES is not subject to EU regulations. Nevertheless, managers still consider the role of ICES scientists as providing salient advice in the fisheries management process. Managers do expect ICES to be bound by the agreements reached between managers and scientists that are contained within the Memorandum of Understanding. The STECF, as an embedded organisation, is seen as a tool for the Commission to help fulfil their objectives, and the managers expect the scientists within the organisation to perform this supporting role.

As shown by the vignettes, despite the membership of the STECF consisting of many of the same people involved in ICES, these meetings are driven to a far greater extent by the needs of managers for usable advice. The scientists in STECF are cognisant of what would be “helpful” for the managers to know, while in ICES they are more cautious of providing quantitative assessments in which they have little confidence — they do not want to “do the numbers” so as to endorse a course of action which they are not confident in. A further distinction might also be made between ICES' ACFM (the committee which provides advice to ICES' clients) and the subgroups performing the assessments. For the subgroups, there is even less recognition of the needs of managers', as shown in a meeting record from Wilson and Hegland [1]:

Scientist One: We are trying to do a mixed fishery forecast. You just suggested we put forward a scenario, while I thought this was just sensitivity analysis. If you suggest options, then one may be taken up, but this sensitivity analysis shows that this model is very sensitive to how it is set up. *Scientist Two:* But that is a political decision. If we don't think we can explain this we should not put it forward. *Scientist One:* After this discussion with [another scientist] it sounds like we can't really explain this model. ...I have not been in the sub group, if they can explain it then I have no problem. *Scientist Three:* If they can explain this for the lay people who will read this? *We are not writing for managers, we are writing for ACFM* and they can decide if they want to go forward [1].

The position of ICES, which displays a degree of autonomy while maintaining a key role within the policy process, suggests that Alcock's [5] simple dichotomy between autonomous and embedded organisations does not adequately represent organisations such as ICES which seek to find a middle ground. To some extent, for example, ICES seeks to address the divisions between scientists and managers by providing for management

input in certain working groups, as noted in the first vignette. Nevertheless, Alcock's [5] emphasis on autonomy and involvement does highlight important issues which impact on the role identity that actors within these organisations identify with.

5. Common ground?

While scientists and managers prioritise different aspects of advice (i.e. salience or credibility), both can agree that some degree of each is necessary. This supports Clark et al.'s [9] assertion that each participant in the assessment process has certain thresholds of salience, credibility and legitimacy that must be met.

Among managers, for example, while prioritising salience, as with scientists there is a shared sense that the advice on which policy is based must also be credible, in order to produce sound management. One manager describes the need to combine credibility and salience:

For years we have tried to draw scientists' attention to the fact that they were under pressure for producing products to be praised on the basis of scientific excellency. Then we add another axis as we draw relevance (Fisheries Manager, 2004).

However managers' understanding of credible amounts to the "best available" science, which may not necessarily be as credible as scientists would like. Thus where ICES considers there to be inadequate data for an assessment, managers still look for some degree of help from scientists in making recommendations. As one manager describes, this has not been the case:

Basically for all the stocks for which we are now implementing a recovery plan, ICES has not been able to provide us with these [catch forecasts]. So now we have a Harvest rule but with no input to it, so we are not in a position to actually apply these formula, because we simply do not have the scientific advice ... The consequence of that is that the Commission has to sit down and try to give its best judgement and there is very little — if any help from ICES for the scientific advice, they just say that TAC should be zero, no fishing (Fisheries Manager, 2004).

The need for the best available science does not mean that managers have a lower ideal level of credibility than scientists, instead just representing the fact that they wish for a different response in the face of uncertainty. Indeed, some managers are critical of the credibility of advice coming from ICES, which they see as part of the problem:

We are aware that the quality of advice is very uneven. And that could be for many reasons; it could be that scientists simply haven't been given worthwhile or reliable data on which to make any analysis at all. It could be that the number of people involved in the analysis has been maybe too small to allow the injection of alternative ideas or alternative approach, it could be that ICES itself has not really applied some form of quality control peer review, to make sure that everybody is working to the same standards in terms of quality of data (Fisheries Manager, 2004).

Managers recognise that this may be due to a host of problems, including poor data availability which is beyond the control of the scientists. As such, the Commission proposal for scientific advice includes measures to improve data collection. The fact that much scientific advice shows a high margin for error means the managers' expectations for

reliable scientific advice on which to base policy is often (i.e. based on their need for credibility) unfulfilled. A common criticism among managers regards the fluctuating TACs that result from highly uncertain scientific advice — this can be seen as the main impetus for the demand for fixed harvest control rules and multi-annual quotas. Managers are highly aware that uncertain, fluctuating advice undermines the authority of their recommendations.

While prioritising credibility to a far greater extent, fisheries scientists similarly appreciate the need for salience, sharing an understanding that legitimisation of their research is increasingly based on perceived relevance for decision making. If assessments are not considered relevant, assessments will fail to be influential. Nevertheless, they are often uneasy about the idea that they should provide numbers where they are highly uncertain:

There are some extents to which we're guessing really the extent to which boats are misreporting in order that you can estimate the TACs for them to misreport next year. So that is a sort of downward spiral... It's... But at what point would I say "no we can't..."? I think with a lot of stocks we're quite close to that. It's hard to define exactly what would lead me to make that statement (Fisheries Scientist 2004).

In cases of high uncertainty, scientists expect managers to be able to make decisions without scientific input. However, one scientist was highly critical of managers in this respect, saying: "[Commission Managers] just aren't prepared to stick their neck out and make any decisions without something called 'science.'"

As with the concept of credibility, scientists and managers also differ to some extent in how they understand the meaning of salience. For scientists, this stems in part from their cultural background, as noted by Wilson and Hegland [1]:

From the point of view of the managers in the Commission, there is currently a gap between the form of advice that the scientific system is geared to deliver and the form of advice that is increasingly needed. Perhaps the critical issue is the need for the operational units reflected in the advice to match those of the fishing activities managed. Fisheries scientists traditionally worry about units defined by nature. This is mainly single fish stocks, or increasingly biological and ecological interactions between stocks and between the fish and their environment. All of these things have, in principle, natural referents that exist beyond their social construction. Managers, however, manage fisheries, which are complexes of fishing ports, fishing boats, and fishing gears that are hybrids of natural, technical and social phenomena, some of which refer only to a social construction [1].

Thus for managers, "salient" advice considers the complex interactions that they must deal with every day. However for scientists, the focus is on biological units, and so "salient" advice is that which adequately deals with biological components that are relevant to fisheries.

While the groups may not share a common understanding of concepts such as salience and credibility, the fact that they agree on their importance indicates that there are areas of common ground, which might be built upon to design assessments that balance the needs of each group. Also, while much may be made of the different role identities and expectations of managers and scientists, they are often able to recognise the problems that each group face. Many managers come from backgrounds in fisheries biology and

therefore do understand the difficult situation scientists find themselves in, given the lack of data. Many scientists are also aware of the political process of negotiating management measures, and recognise the Commission's need for a number to start from.

But they say, well, give us the catch options table so we can see what that means in terms of a TAC: and then that becomes a starting point for the horse trading...there's no way out for the Commission because they need someone to blame for producing that number (Fisheries Manager, 2004).

However, while this limited awareness of respective needs exists, scientists and managers are firmly driven by their role identities, and the institutional constraints acting upon them, which work against the development of shared understandings in terms of advice content.

One area where scientists and managers appear to agree is in the notion that the current fisheries assessment system fails to meet the needs of salience and credibility, however they are defined. As we have seen, managers feel advice is irrelevant, as well as highly uncertain and fluctuating. Managers at the Commission realise that TACs have not helped them reach their mandate, that of sustainable exploitation, and tried for a few years to consider the use of technical conservation measures, and even closed areas. Among managers there is growing frustration since single stock assessments do not allow managers to take account of species interactions, and can lead to conflicting recommendations:

Since you have mixed fisheries you cant fish two species and not have the third...that is one of the things that we had said to the scientists when they said to us, well you should not fish cod and, but at the same time they tell us, you may fish so and so much of haddock and plaice and whatever...whiting. So for us this doesn't make sense. And it's a scientific advice that doesn't really fulfil our needs...what they should have done, was to look at the whole thing together and give us advice on that (Fisheries manager, 2004).

Scientists are also well aware that the nature of advice is inadequate, and a particular problem both groups agree on regards the use of single-stock assessments and TACs. As one manager notes:

It is more and more clear that scientists are not able to predict in short term the fishing possibilities with the precision needed...from the technology system we have now (Fisheries Manager, 2004).

It is recognised that the attempt to predict possible catch opportunities each year is prone to ongoing uncertainty and consistent fluctuation due to the complex nature of marine ecosystems. Driven in part by these problems, the fisheries management (and advice) system is in a state of transition with reforms taking place at several levels. Part of the CFP reform regards a change to the nature of advice. As such, the Commission requested from 2003 that ICES implement multi-species, multi-fleet short-term forecasts.

Our interviews, which have occurred throughout the review process, suggest that despite this reform, role concepts remain unchanged. In fact, one could even say the reform is taking place with a view of improving the system *in order to conform with* role concepts, particularly those of the managers, that expect salient, practical advice. While attempts to reform the system are welcome to many managers and scientists, the proposed reforms fail to address the conflicts caused by the divergent role identities of scientists and managers. The switch to multi-species, multi-fishery advice, as well as increased use of harvest control

rules, for example, simply exacerbates the conflicts between the needs of scientists and managers by increasing the demands placed on the advice. One manager, quoted earlier, acknowledged that they are now demanding more comprehensive and precise advice than before. One point to note is that short-term forecasts, with their inherent uncertainty, are still requested.

ICES has attempted to respond to the pressure placed on them for mixed fisheries advice, but indicate that they lack the data necessary to provide reliable advice, particularly as regards discard data. This problem was described by one manager:

Unfortunately, for all these stocks for which we have now adopted recovery plan with harvest rules based on — most of these harvest rules are based on the idea that you should rebuild the stock by spawning stock biomass (SSB) by 30% next year. They are all relying on catch forecasts from the scientists, forecasts of fishing possibilities. Basically for all the stocks which we are now implementing recovery plan, ICES has not been able to provide us with these. So now we have a harvest rule but with no input to it, so we are not in a position to actually apply these formulae, because we simply do not have the scientific advice ... (Fisheries Manager, 2004).

As indicated in Section 4, it is in situations such as these, i.e. poor data availability and consequent uncertainty, that the conflicts between managers and scientists are most prevalent. Hence reforms which increase the demands placed on the data can be expected to increase the gap between what the Commission both needs and expects scientists to provide, and the limits to what ICES considers it can reliably provide, given the available data. Some recognition of this fact appears within the Commission, and the communication on scientific advice declares the Commission's intention to establish better procedures for data collection in order to allow ICES to perform these analyses. This can be seen as vital if the role conflicts are to be resolved.

6. Conclusion

Role identities and expectations among managers and scientists show considerable divergence, as a result of both cultural understandings and institutional constraints, which is reflected in the different demands the two groups make on the management process. Culturally, scientists are driven by the desire to apply rigorous methods of analysis based on data sets in which they have confidence, while managers look for the best that is available at the time, in a well-packaged format that can be easily applied. Institutionally, managers have a broad mandate to follow and expect scientific advice to be a precise tool to help them to fulfil this purpose. For scientists in ICES, the longstanding reputation for scientific credibility remains a key institutional constraint, as indeed it does within the STECF. In the STECF however, there appears to be a greater attempt to meet the needs of managers, and the creation of this body can be considered to have been a positive step towards reconciling the two roles. While this difference between the two organisations is evident, it must be noted that ICES has taken steps toward greater involvement with managers which to some extent challenges the institutional constraints acting upon it.

These conflicting role identities cause considerable frustration for both scientists and managers, and could result in a breakdown of communication and co-operation if unaddressed. While cultural and institutional drivers of these role identities will most likely persist, greater recognition on both sides of these differences could allow these frustrations

to be minimised. If the on-going reform of the fisheries management system in the European Union is to be ultimately successful, managers and scientists must work harder on ways to meet each other's needs. At the very least, ongoing two-way communication is needed among the two groups in order to foster understanding and cooperation. Similar frustrations and cultural misunderstandings have been documented in other fields where members of different subcultures must work together and rely on one another to complete their expected tasks. In the case of nurses and doctors in hospitals [16], where role identities conflict and expectations are unfulfilled, a breakdown of communication and co-operation ensues, negatively affecting the health of the patient. In the case of fisheries management, it is the health of the fisheries which is affected. With the right initiative and productive dialogue, however, managers can progress on the path towards successful fisheries management reform.

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