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ARTICLE

The Importance of Involving Stakeholders and Scientists in the Management of Marine Fisheries

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ABSTRACT

In recent years there has been increasing concern over the state of fish stocks, especially those that support key fisheries and supply food to many consumers. There is also concern over the state of aquatic environments, and the effects of climate change. Fisheries management is controlled by government agencies, often cooperating with similar agencies from other nations. This paper deals with the need for expert advice on fisheries, involving fishers as well as scientists. Mention is made of a Fisheries Partnership set up in Europe, bringing fishers and scientists together with other stakeholders to discuss the problems of managing fish stocks. The partnership was especially successful in improving relationships between fishers and scientists, and made significant improvements to some fish stock assessments. European Regional Advisory Councils were later established to play a similar role. They are providing significant advice on fisheries, but they do not yet play a key role in actual management. It is important to consider how stakeholders and scientists can become more actively involved in fisheries management. There is a crucial need to develop new, more participatory ways of managing fisheries.

1. Introduction

Many fisheries around the world are in a state of crisis. Catches are falling and the state of some stocks is extremely poor. Many fish stocks are being heavily exploited, and some are severely depleted. Despite these problems, in some areas of the sea fishing capacity continues to be heavy, and the level of exploitation of fish stocks remains high. Many stocks are not safe, and in some cases they are close to collapse. FAO (The Food and Agriculture Organization of the United Nations) publishes information every year on the state of fish stocks from around the World [1].

I was involved in the management of the North Sea fish stocks, as the Director of Fisheries Research for Scotland. I also served as the chairman of the North Sea Fisheries Partnership, and the Rapporteur for the North Sea Advisory Council. More recently I reported on a conference on Best Practice in World Fisheries, organised by the the Blue Marine Foundation and The Fishmongers' Company [2]. The purpose of this conference was to look at how countries around the world managed their fisheries and to consider what lessons the United Kingdom might learn from their experience and apply to its own waters in the event of leaving the EU and its Common Fisheries Policy (CFP). After leaving the EU the United Kingdom will need to develop its own system for managing fishing in its waters, while continuing to have international cooperation

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in fisheries policy, particularly with the EU and Norway. This paper considers the importance of involving stakeholders, as well as scientists in the management of marine fisheries.

Each fish stock is an inherently self-renewing resource, capable of being managed in a sustainable way, but such stocks are very easily over exploited. Many fish are mobile and widely distributed, and cannot be managed by any individual fishing community or nation. With free access to a fishery, the number of fishing vessels increases, catching technology and efficiency improves, and the resource may come under severe pressure. A race for fish can develop where many fishers from a number of nations are chasing too few fish. Fish are then removed through fishing at a rate faster than they can reproduce themselves. Fishermen are living off the natural capital of the resource, rather than the interest. The management of fishing activities exploiting such fish stocks is difficult and fragile, and the stocks themselves end up in a state of decline.

Fishing also has an impact upon marine ecosystems. Trawling for fishes, and dredging for invertebrates like scallops, crabs and lobsters, may degrade habitats and destroy flora and fauna. The removal of organisms other than fishes, either deliberately, or as a by-catch, may affect their abundance and diversity. Fishing can also have an impact upon charismatic fauna, such as seabirds and marine mammals, evoking strong public concern. Noise from fishing vessels and their trawls, and from other human activities, may also have adverse effects upon marine wildlife by changing the soundscape or acoustic scene. Sound is really important to fishes, and other marine animals including invertebrates. Extraneous sounds, termed noise, can damage them physically, and also change their behaviour; making them leave the locations where they live, cease spawning, and change their migratory behaviour [3]. Noise may also interfere with the detection of sounds that have biological importance. Many fishes communicate using sounds, especially when they are spawning [4]. A balance has to be struck between fisheries and other human activities, and the state of the aquatic environment.

Fisheries management is highly dependent upon scientific advice [5]. Scientists are needed to assess the condition, location and degree of separation of fish stocks, and to examine the effects that fishing has upon the stocks. It is also necessary to monitor the state of the marine environment, and examine interactions between fish and other animals, including marine mammals and invertebrates. Fisheries science is especially important for supporting management and includes science for stock assessment, the evaluation of impacts, and the allocation of resources. A major issue, discussed at the recent conference, includes how best to obtain the scientific data [1]. For example, in monitoring catches it is important to do some of this from fishing vessels, either by making use of human observers or using video/electronic means for data gathering. Data collection by the industry itself can be very important, and can be facilitated by familiarising fishers with the science. Decision-making must include stakeholder involvement, transparency and accountability.

Fisheries managers are civil servants, aided by their own technical experts. They often interact with civil servants from other countries in the management of the fisheries. This can sometimes result in disagreements as a result of political differences, and may influence management adversely. It is especially important that fisheries managers also involve and consult the stakeholders actually involved in fishing – including the fishers themselves – as they can also provide especially useful advice.

To maintain fish stocks in a sustainable state, governments and international agencies have often placed strong controls upon the operation of the fisheries. Output controls are imposed to regulate the quantities and sizes of fish landed through quotas and minimum landing sizes. However, because the stocks are often caught in mixed fisheries, where productivity varies between stocks, simply introducing restrictive catch limits on depleted stocks does not always result in reduced fishing pressure on those stocks that are either at risk or depleted, because fishers continue to fish for the more productive stocks, and discard fish from those stocks for which they do not have available quota [6]. It is important to monitor the discarding of fish. Input controls are sometimes introduced to restrict access to the fishery through: licences which limit the number of boats; regulations that confine fishing to particular fishing gears; restrictions upon the capacity of vessels; limitations on days spent at sea; and the closure of some areas of the sea. Imposition of these controls brings particular problems for fishers, and others involved in the fishing industry [5]. It is important that stakeholders should be consulted, and their views taken into account, before such controls are imposed.

There is often a loss of faith in the procedures adopted for governing or regulating fisheries. It is crucial to deal with the need for the reform of fisheries management through the involvement of stakeholders, including the fishers themselves, others engaged in the fishing industry, environmental interests, independent marine scientists, and perhaps even the purchasers and consumers of fish.

2. Assessing the State of Fish Stocks

In order to ensure appropriate and effective fisheries management, there are a number of key steps that have to be

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taken. It is important to obtain valid scientific information on the state of fish stocks, and on the condition of the environment which supports them [5]. There is increasing evidence that many fish stocks are small, discrete and local, existing on a scale that is significantly smaller than those defined for management purposes. Stock definition is very important, but few resources have been available to examine fish stocks in detail. The prevention of damage to fish stocks depends on scientists being able to define local spawning populations, as heavy fishing in a particular area may eliminate small, local stocks. Fisheries management must be focussed on actual discrete fish stocks, rather than the larger fish groups living in major ocean areas.

There is a particular need to apply appropriate and effective control measures relating to individual fish stocks, that take account of the experience and knowledge of the fishers themselves. There is also a need to protect the marine environment, and especially the habitats occupied by fishes, taking account of environmental interests. Currently, advice on the state of fish stocks is provided mainly by specialist fishery scientists, working for national governments. They collaborate with one another internationally, within independent organisations like ICES (The International Council for Exploration of the Sea). Such organisations provide advice on the state of fish stocks and the management of fisheries to individual countries, and to international administrations, like the European Commission. The Commission also has its own scientific advisory organisation, the STECF (Scientific Technical and Economic Committee on Fisheries), which provides economic as well as scientific advice.

The government employees that provide scientific advice often collect their information on fish stocks from the fishes that are being landed at fishing ports [5]. They rarely go to sea on fishing boats to collect data on the fish being caught, and also to examine those fish being discarded rather than landed (usually because those fish are outside the quota limits set for individual vessels). The scientists are also interested in collecting information on the fishing effort that is being expended, such as how long a net is dragged behind the vessel before it is full. Government research vessels are used to carry out surveys of the abundance and spatial distribution of fish, including eggs, larvae, and juveniles, in order to estimate stock recruitment levels. Scientific activities are usually based within government laboratories, controlled by civil servants [5]. It can be useful for such scientists to collaborate with fishers, and to obtain information by working on the fishing vessels themselves. In particular, this can enable them to examine the numbers of fish that are discarded, rather than landed. Collaboration between scientists and fishers can improve the data on fish catches and discards.

The condition of individual fish stocks often has to be assessed within different areas. It is especially important, however, to obtain information on genetic differences between fish stocks and their spatial distribution within an area. Information on the size and spatial distribution of genetically distinct fish stocks is especially important. The stock assessments carried out by scientists are largely based on analysis of the catches and landings of fish. Attention is focussed on the ages of the fish being caught, and how the age composition changes with time. Quite a lot of data needs to be collected over long periods to obtain valid stock assessments. It is difficult to estimate how stocks will change in the future. The state of fish stocks is always rather uncertain, and this creates difficulties for fisheries managers. It is not always easy to assess how effective earlier management decisions have been in terms of improvements to the state of fish stocks [5]. There is a need to validate the collection of data on catches and landings, and this is best achieved by involving the fishers themselves. It is especially important to promote discussion between fisheries managers, scientists, fishers, and other key stakeholders. It has been emphasised that data feedbacks are a key component to effective fishery data systems, ensuring that fishers and managers collect, have access to and benefit from fisheries data as they work towards a mutually agreed-upon goal [7].

Very little attention is currently being paid to the relationships between different fish species. Some fish prey upon other fish, and changes in the abundance of the predator will affect the prey species. A distinct example is the Atlantic cod, which preys upon fish like the sandeel, herring and sprat, and also preys upon key invertebrates like scallops, prawns, crabs and langoustines [5]. Some of the smaller fish and vulnerable invertebrates are removed by many predatory fish species. Other animals and plants may also be adversely affected by fishing. Bottom-trawling can have adverse effects upon corals, and other benthic organisms. However, some of the commercial fish species themselves are also affected by predators, including dolphins, whales, seals and even seabirds. Although fishing may deprive predators of their food, it is also the case that increases in predator abundance can have adverse effects upon the fishes themselves, and also upon the fishing industry. For example, the recent increase in the abundance of seals along the Scottish coast has resulted in a decline in salmon populations, and deterioration of the salmon fisheries in Scottish rivers [8]. It is evident that both increases and decreases in fish stocks may have adverse effects upon the aquatic environment. It is really important to follow an ecosystem-based approach to fish-

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eries management, although it is not always clear how this can be achieved.

Changes in the environment may also affect the state of fish stocks, and it is important to take environmental changes into account when carrying out fish stock assessments [5]. Currently, major changes in the ocean climate are affecting fish stocks in areas like the North Sea [9]. Some fish are changing their locations, and this is affecting the state of local fish stocks, and also the catches made by fishers at various locations. Environmental changes are also affecting the predators of fishes. For example, puffins and other seabirds are changing in numbers as a result of warming of the North Sea. It is thought that climate change is affecting sandeels, the food of puffins, severely. And increases in the number of storms may also damage the feeding behaviour of the puffins.

Some of the adverse environmental changes in the sea are introduced by humans, including pollution by chemicals and plastics, and the generation of anthropogenic noise, all of which can affect fish and other animals adversely. Heavy shipping, including cruise ships and recreational vessels, together with oil and gas exploration, drilling and dredging, and the construction and operation of offshore wind farms may all have adverse effects upon fish. It is really important to take activities that result in environmental changes into account in managing fisheries. Fish stocks may be changing as a result of impacts other than fishing, and setting targets for the SSB (Spawning Stock Biomass) must take account of such changes. Where fish stocks and other animals are being adversely affected by human activities other than fishing it is important to take those activities into account, and to regulate and restrict such activities as well as fishing itself.

In adopting management measures, and enforcing them, it is really important to involve fishers themselves, as their knowledge can be very valuable. Fishers know how some people that are fishing might avoid the control measures that are introduced by fisheries managers, and they may also be more aware of both the benefits and disadvantages of different measures, compared to the managers themselves, who are often land-based civil servants who do not go out to sea very often. It is important to enlist the aid of fishers, both in assessing the fish stocks and managing the fisheries. Fishers need to participate, together with other stakeholders, in fisheries management. They are often aware of the changes in fish stocks within the areas that they fish, and they may not agree with the views of scientists and fisheries managers, who often rely on rather poor data about the state of fish stocks. It is really important that the knowledge of fishers, and the information that they have, is used to improve fisheries management, although fisheries managers and scientists may often be reluctant to consult fishers.

3. Involving Stakeholders in the Management of Fisheries

There is a need to change the way that fisheries management is carried out. In particular, there is a need to bring stakeholders, including fishers and environmental interests, into the organisations that carry out fisheries management. It is important to involve scientists that are employed by governments, as their advice may be based on significant scientific activities, funded by the governments. However, it is also useful to obtain advice from independent scientists, as their work may be less influenced by governments and politicians, and may extend to a wider range of factors that may influence fish stocks. Such scientists can closely scrutinise and peer review the stock assessments, as they are being carried out, and can take additional factors into account, including other human activities that may influence fishing.

The involvement of a wider range of stakeholders, and the introduction of independent scientists, requires changes in the structure and organisation of management systems. At present the management systems are dominated by the bureaucrats employed by governments and international organisations. Different institutional arrangements are necessary and must be designed to improve the independence of the management systems and bring in the key stakeholders, and independent scientists. Some changes have started to be made to the management of fisheries in Europe.

4. The Establishment of Fisheries Partnerships

It is especially important to bring fishers and scientists together with other stakeholders, including environmental specialists, to discuss the problems of managing fish stocks. It is important to open a channel for fishers' own knowledge to be taken into account, and to enable stakeholders to comment on the stock assessments, in order to contribute to better decision-taking by the relevant authorities. Within Europe, such a partnership was established in the past to facilitate the improvement of advice on fisheries management. At a meeting of scientists and fishers from around the North Sea, it was concluded that the establishment of such a partnership would bring key stakeholders into fisheries management, and would help to improve the fish stock assessments and the management decisions subsequently taken [5]. The North Sea Fisheries Partnership was set up by the North Sea Commission, a group of local governments from around the North Sea

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that included local bodies from the European Union together with some others from Norway. The Partnership was set up in 2000, and scientists and fishers were involved from all the countries around the North Sea [5].

The North Sea Partnership was set up to promote cooperation between fisheries scientists and fishers from the appropriate countries. The aim was to improve scientific advice on fish stocks, using information from the fishers themselves as well as that collected by the scientists. A number of other participants were also involved, sometimes including the actual fisheries managers themselves. The Partnership proved to be very successful, and resulted in improvements in the assessment of a number of North Sea fish stocks. ICES scientists also became involved, as well as a number of independent scientists. The Partnership enabled fishers from around the North Sea to comment on whether the scientific assessments were in accord with their own experience. There is a strong case for establishing similar partnerships for fisheries areas around the World.

5. The Establishment of Regional Advisory Councils

The Partnership discussions that took place between fishers and scientists resulted in an agreement that there was a need for a permanent council, which enabled stakeholders to take part in providing advice on fisheries management. The European Commission itself had also decided that such a council was needed to bring about the involvement of stakeholders [10]. The Commission's own roadmap on reform of its Common Fisheries Policy [11], suggested the establishment of RACs (Regional Advisory Councils) to bring this about. A new regulation was agreed, and the first RAC was established for the North Sea, involving some of those fishers and scientists that were participating in the North Sea Fisheries Partnership. The Partnership provided considerable guidance to Member States and the Commission on how the RACs should operate. There are now many more RACs (now termed Advisory Councils or ACs). They provide advice to the European Commission, Member States, and the European Parliament. The structure of the ACs, and the procedures they must follow, are set out in a document from the Fisheries Council [12].

6. The Operation of the European Advisory Councils

The European Advisory Councils are essentially stakeholder-dominated organisations that provide advice to both the European Commission and Member States on fisheries management issues. This includes advice on conservation and socio-economic aspects of management, and on the actual suitability of the current rules. The Councils also contribute key information and even scientific data on fisheries management and conservation measures. They include fishing industry representatives, together with representatives of environmental organisations. They receive EU financial assistance.

In addition to the initial North Sea Advisory Council (NSAC), ACs now exist for a number of other seas, including the Mediterranean, Baltic, North-Western Waters, and South-Western Waters. They also exist for the High-Seas/Long-Distance Fleet, Pelagic Fisheries, and those engaged in Aquaculture. They have greatly enhanced the participation of fisheries stakeholders in providing advice on fisheries management. The ACs also include representatives of environmental organisations, recreational fishers, and fish buyers and sellers. The Commission and Member States are represented by "active observers" at the various meetings of the ACs, together with any scientists invited by the ACs. Unlike the original Fisheries Partnership, however, the scientists do not play a key role in the ACs, as they are present as observers rather than key members. It has been suggested by Long [13], that the ACs are really important, and that the European Commission and Parliament, and the Member States have now become convinced of the importance of obtaining advice from fishers and other stakeholders on key fisheries issues.

An example of the advice provided by an AC is that provided by the NSAC on the implementation of the Landings Obligation (LO). The LO is legislation intended to ensure that certain catches of fish, that are environmentally protected or surplus to the vessel's quota allocation, are no longer allowed to be discarded at sea; otherwise known as the 'discard ban'. Preliminary steps have introduced since 2013, but the full Landing Obligation came into force in January 2019. It is one of the most difficult issues facing the fishing industry under the CFP. The NSAC have focussed on the issue of "chokes" – species with a low quota, where the discard ban can cause a vessel to stop fishing, even if they still have quotas for other species. The NSAC have pointed out that it is crucial to define choke categories, in order to find suitable mitigation measures, and avoid wasting time and resources on exploring options that are unlikely to be helpful. They have made it clear that the problem of potential chokes in mixed fisheries has proven to be much more problematical than initially foreseen, and the species/fisheries chosen for inclusion have meant that many of the problems have been avoided rather than being addressed. They have emphasised that to some degree the full implementation of the LO will constitute a "big bang" that will have adverse

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effects upon some fishers. NSAC members have welcome the reduction in unwanted catches that may be provided by the LO. Concern has been expressed, however, that recent measures and sustainable/good practices applied within the context of the CFP to achieve this reduction may be overshadowed by too heavy a focus on the LO, and the generation of choke species.

The ACs are simply consultative bodies, and they have yet to play a stronger role in fisheries management. It is important to consider for many World fisheries how stakeholder representatives can become more actively involved in fisheries management, together with independent scientists.

7. The Future Involvement of Stakeholders in Fisheries Management

It has become clear that involving fishers and other stakeholders in providing advice is very important. At the moment, however, stakeholders are not actually allowed to be involved in taking management decisions. That has currently to be left to those who work for governments and other administrative bodies. It will now be important to develop procedures whereby the stakeholders, including fishers, environmental interests and independent experts, can become more involved in arriving at the conclusions that lead to particular decisions. There is an especially strong case for involving independent scientists in arriving at conclusions on: the state of fish stocks; the state of the environment and the likely impact of fishing upon it; other human activities, including pollution by chemicals, plastics and anthropogenic noise; and factors like climate change. Independent scientists may work on subjects that are outside those considered by government fisheries scientists, and they can assist in widening the breadth of knowledge.

Of course, if stakeholders are to become involved in taking fisheries management decisions, it will be necessary to ensure that appropriate representatives are selected from the stakeholder groups. There will also of course be problems in bring their different views together and reaching a consensus position. Mechanisms will need to be developed for doing this. There is, however, a real need for more participatory forms of fisheries and environmental management.

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