

Fol. 41 T

ICES C.M. 1994

C.M. 1994/T:20

**IMPROVING THE LINK BETWEEN SCIENCE AND MANAGEMENT:  
DRAWING UPON LOCAL FISHERS' EXPERIENCE**

by

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**ABSTRACT**

Norwegian fish stock assessment has not included estimation of coastal and fjord resources until recently. The geographical area varies both in environmental and biological features. Stock assessment is especially difficult in these waters, and existing biological methods are insufficient.

Drawing upon the knowledge of local fishermen in the various areas, may be a way to enhance the biological knowledge on fish distribution in coastal waters. Selected fishers are interviewed about the ecological conditions and the fishing activities, and some are involved as sample collectors. This is an untraditional method in marine research, and it is made possible through an interdisciplinary co-operation between biology and social science.

Information such as fish distribution, spawning time and areas are plotted into maps, resulting in a useful and practical view of the data. Fishing sites being the "property", of fishers means caution in publishing the data. These and other ethical concerns are important learning's from this way of collecting biological information.

Our project can be seen as a way of improving the link between science and management in three ways: 1) More knowledge hopefully gives better management, 2) An inter-disciplinary approach opens for seeing the use of resources and thereby coastal biology as the human project it actually is, 3) Involving fishermen directly may weaken the gap between scientists and fishers, and legitimise science, thereby improving the link to management.



## INTRODUCTION.

Until 1992, there was no assessment of fish stocks in Norwegian coastal areas. All biological fish resource investigations focused on the large fish stocks mainly distributed offshore. Consequently the management of all commercial fish stocks in Norway was undertaken mainly on basis of the knowledge of the large oceanic fish stocks. The official opinion, although not supported by research, was that coastal fish resources were of small size, and thereby of low economic value. In 1992 Fiskeriforskning, Tromsø, started a research programme trying to estimate the stock sizes of the main commercial fish species occupying inshore waters of the Norwegian coast north of 62 ° N. The results from the investigations reveal that there are significant amounts of several commercial important fish species occupying the coastal areas throughout the year. The results also reveal the existence of local stocks of cod (ELIASSEN et al 1993). Carrying out stock assessment studies in these waters are especially difficult particularly due to differences in ecological and environmental condition both between fjords and from region to region of the coastline. Existing biological methods seem somewhat insufficient under these circumstances.

There is a growing awareness of the limitations of science as the suitable knowledge system to describe holistic systems. The main question concerns the scientific method: Is the scientific description of a system reliable, as it is a reconstruction based on analysing fragmented parts of it? (Smith 1991, Wolfe et al. 1991). Fishers have a comprehensive marine ecological knowledge about their local waters, not only the fragmented parts of it, but also on how the parts work together. Drawing upon this knowledge of local fishermen in the various areas, could therefore be a way to improve the scientific investigations on coastal and fjord fish resources. In addition, being present in an area throughout the year, fishermen could provide biological samples continuously. This kind of sampling regimes would be impossible if the scientist should do it themselves. In practice this means including fishermen in the work of the biologists. This entails the necessity to understand the fishermen's knowledge in a social context. For marine scientists, talking with fishers is an untraditional method of doing research. Biologists are trained to gather so called "hard data" and have no skills in social scientific methods. Through an interdisciplinary co-operation between biology and social science, the use of local fishermen's' knowledge in assessing fish stocks have been possible.

This paper discusses our experiences so far, in the use of the fishermen's knowledge in fish assessment research. After presenting our project we discuss three ways in which we think this approach can improve the management of natural resources.



## PROJECT PRESENTATION

From a fishery assessment point of view, it is important to cover a largest possible geographical part of the coast. Fishermen from a particular region was initially selected from a census paper. In the selection we tried to get hold of fishermen in a wide range of age and from different groups of the coastal fishing fleet (vessel size, gear types etc.). Due to the fact that small scale fishermen are the main group exploiting coastal fish resources, they were the major group. In addition small scale fishers are the most abundant group fishing in coastal areas. The selected persons were contacted by telephone and asked to talk with us about their experiences concerning local fishing activity and fish biology.

After making appointments with each fisherman we travelled around to the different sites interviewing them. Main questions during the interviews were about fish migration, local spawning sites and annual distribution features of important species, as well as the fishing activity throughout the year and historical changes in distribution in the area. Maps were used in the interviews to memorise, and information was drawn on them directly during the talks. In addition the maps have been supplied with information afterwards. Consequently, we now have detailed information about fish biological features and fishing activity from the different coastal waters in a part of the north Norwegian coastline. All interviews were recorded on tape. Usually the talks were carried out in the fishermen's homes, sometimes with their wife present, but also onboard fishing vessels and in their wharf side shed together with other fishermen colleagues present.

After the first trip, some of the fishermen interviewed were engaged to take biological samples from their catch. The samples are taken from cod-catches at regular intervals during the fishing season. Initially, we provided the necessary equipment and written instructions on how to take the samples. Later on, we met with the fishers to discuss their experiences so far. This work have only lasted for a short time. However, we have received some samples of cod taken regularly at several sites along this coastline during a short period of 1994. The sampling will continue throughout 1994.



## DISCUSSION

Drawing upon local fishers experience in fish assessments, can be a way of improving the link between science and management in three ways:

### 1. More knowledge hopefully gives better management:

Through the interviews we get a more detailed knowledge on coast and fjord resources. Fish presence and distribution in time and space, spawning times and places are important data. Through talking with fishers in different areas we also get a body of knowledge on local variations. These data are an invaluable help in performing assessment work on coastal fish stocks. We get a context around our data, useful both for the timing of biological cruises and for interpreting the data from the cruises. Furthermore, the collection of samples throughout the year is a practical way of getting data. The samples indicate the amount of local stocks relative to oceanic stocks. This information are of particular importance in the question about management of local and oceanic stocks.

Local knowledge is rich in contextual detail (Freeman 1989). By collecting fishers' stories over a large geographical area, we can find general and systematic differences and similarities in this particular area. This broad picture of an area, as well as the particular stories, enables us to set up new hypothesis or questions. The interviews thereby provide the basis for developing new biological knowledge, by improving the data for the existing biological research. On the other hand they provide us with information on topics where biologists have no research so far<sup>1</sup>.

One example of interviews helping existing research, is that we now can refine hypothesis about local stocks. So far, biologists only have evidence for the existence of local stocks of cod in the various fjords in Northern Norway (Eliassen et al. 1993). However, data from our interviews indicate the presence of local stocks on the coast as well. Fishers talk of both coast and fjord stocks, and some actually date the eradication of some of these stocks. The experience-based knowledge, besides supporting the existing biological knowledge on fjord stocks, thereby leads to a refined scientific hypothesis: Local stocks is not only a fiordal phenomenon, some stocks are coastal. An example of interviews highlighting new issues to be considered in the Norwegian marine biological research, is that we learn that the weather

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<sup>1</sup>DeWalt (1994) argues that natural resource management can be improved exactly by this form of interaction between local and scientific knowledge systems. He also stresses the role of the social scientist as a mediator between the two systems.





influences on fish behaviour; e.g., acoustic detection of fish may be difficult after strong winds. Furthermore we learn that the lunar phases affect the catches, and for some species also the migrating behaviour. Both aspects should be studied further, especially since acoustic detection is important in estimating stock sizes.

Besides collecting strictly biological information, we talk with fishers about fishing activity. Catch data, that is annual catches throughout the year in various areas, as well as the use of different gears, are important inputs concerning catch per unit effort<sup>2</sup> (CPUE). The focus on the fishing effort which local resources have been subjected to, indicates how local stocks develop. The focus on the harvest patterns also shows who are the potential users of the resources. This gives interesting information on local management regimes and perceptions of rights to catch the different resources, an issue which leads us to the second point where we believe this way of collection biological information has a useful potential in improving the link between science and management.

## **2. An interdisciplinary approach opens for seeing the use of resources as the human project it actually is.**

Our focus in questioning fishers is local biology and activity. To be able to **interpret** the information on biology and activity, a social understanding of fishing is a prerequisite. To get a social understanding, a broad knowledge about the fishing and/or about people's social and cultural systems, is needed. This is not integrated in the biological discipline, and the interdisciplinary approach biology/social science is therefore necessary. We will exemplify the importance of interpreting the information: A fisher could use a sea system for catching squid. When asked why he does not catch cod, he could say cod was scarce in the area. However, by interviewing other fishers we find that they use the area for cod fishing. So is cod absent or affluent? Our previous knowledge of fishing, by studying the social organisation of it, tells us that the reason for different perceptions of the presence of cod, could be due to perceptions of **rights** to fish cod locally<sup>3</sup>. Perceptions of rights are not outspoken, it is rather managed by practical actions: Locals fish, strangers don't. Not knowing this, the biologist could be misled by the information given.

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<sup>2</sup>CPUE data are important information in the marine biological methods for estimating stock sizes.

<sup>3</sup>Perceptions of rights are not well documented in Norway, but a few works deal with the issue in one way or another: Arntsen 1994, Bjørklund 1991, Eythorsson 1991, Jentoft og Kristoffersen 1989, Lunde 1994, Maurstad 1993.



It is also necessary to have a social understanding of fishing, for knowing how to **use** the data. People tell us secrets. They talk freely of spawning sites, show the exact positions on maps. When asked would they accept this information to be broadly known, implying fishing effort on the spawning sites could increase, the answer is no. However, they are a bit surprised by the question: "Don't we have the same intention as they have, preserving the stocks?" Another interesting comment is: "You're sensible people, you'll know how to handle this." The point we want to make here, is that to pose the question: "Do you want this information revealed", you need a knowledge about fishing which is not a part of the biological discipline. You need to know that secrecy is a part of fishers social systems and system of knowledge (Andersen 1972). The purpose of science, on the other hand, is to reveal; by exploring and presenting the findings of exploration, knowledge is revealed. (cfr. the International Council of **Exploration** of the Sea).

It is the co-operation between the two sciences which enables us to be cautious by revealing, and without assuring that we know what we are doing, people would very soon stop telling us their secrets. The premises for drawing upon local fishers' experience in fish assessment research, is thereby an awareness for the fact that we as scientists face a distinct system of knowledge.

Through our interviews, fishers also meet with our system of knowledge. This brings us to the third field where we think drawing upon fishers experience leads to an improved management.

### **3. Involving fishers directly may weaken the gap between scientists and fishers.**

There is not much of a dialogue between scientists and practitioners. To state it in its extreme form, scientists say it is of low value to talk with practitioners since their statements are highly affected by their personal interests. Likewise practitioners say that science is biased, and they do not trust the results presented by scientists. Among other things, practitioners accuse scientists for being a tool for powerful interests. We hope that the contact between scientists and fishers which our project initiates, will help clear the path of myths in both camps. Not only do **we** get access to parts of the experience-based system of knowledge, **fishers** also get access to parts of science, since we, during the talks, also discuss biological methods of resource management, and results from the ongoing research.



The close contact is maybe more important in another sense. Biologists play an important role in deciding upon catch quotas. Biologists are, like other humans, influenced by their knowledge about people when they recommend actions concerning people. The more knowledge they have on the social influence of their recommendations, the better. Travelling along the coast listening to the severe importance of capelin being food for cod, instead of caught by fishers, really points out the importance of social parameters when considering multispecies connections. A low capelin stock, perhaps combined with a large seal stock threatens the coastal fishing of cod, especially in fjords. When cod is absent it is not possible to make a living out of fishing in these areas.

## **SUMMING UP**

Our project, coupling fisher's and biologist's knowledge, where the social scientist is a mediator and a documentator of the social frames for the knowledge, improves the management of natural resources first and foremost since the biological science and management are so closely linked. Talking with fishers reveal the existence of valuable data which can be used in assessments of fish resources. It enhances the biological scientific knowledge and highlights that resource exploitation is a human project.

Local knowledge is not evenly distributed among the members of a community. There are highly skilled as well as less skilled individuals. Talking with few people means we might miss important information. However, we do prepare the ground for further research, especially on how to do projects like this. As we have put weight on in this paper, we see several positive potentials in this way of work. However, the project has to run for a while prior to a more academic discussion of its pros and cons.



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