FISH STOCK ACCOUNTS - LINKING TOUGH DECISIONS AND EFFECTIVE SCIENCE

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"It's hard to find a happy fisheries manager these days . . . It is also hard to find a happy fisheries scientist . . . Many of them wonder if all they know about harvesting stocks is really relevant to the way stocks are harvested." (Larkin 1993).

How do we "enlighten and move decision-makers " . . . . "and make it possible for them to take tough decisions ?" (Francis 1990 and R.K. Lewis, personal communication).

"Decision-makers take tough decisions when they have good ammunition !" (Moberly, personal communication 1992 ASFB Workshop).

Background

Methods of fisheries management are changing. Autocratic, government-led management systems are being replaced by co-management structures based on partnerships of stakeholders. Since the roles of participants are also changing, fisheries scientists need to re-assess their relationship with these new structures. In particular, they must consider how they can ensure that tough decisions foreshadowed by scientific advice are made when necessary.

The Role of Fisheries Scientists

It is useful to view the role of the fisheries scientist in relation to what can be termed the "Fish Stock Accounts". These are the documents and advice resulting from the collection of data, statistics, models and other information used to measure and assess the state of any fishery's most valuable asset - its fish stock. Not only is this asset the basis for wealth creation in the enterprise, but it is also irreplaceable, difficult to measure and understand and, based on historical experience, at considerable risk of under-utilisation or destruction. Whilst the roles of accountants and planners in relation to an organisation's financial information are accepted and well understood, the analogous role of scientists in relation to fish stock accounts is often still not appreciated.

Fish Stock Accounts

A company's financial system consists of people, procedures, documents and computers. A fish stock information system is similar. However most users will only need to deal with the Fish Stock Accounts, which are the relevant formal documents and advice provided to them by scientists.

The fish stock information system has five components:

1 *Data*
Includes commercial/recreational catch (e.g. catch and effort), research logbooks, scientific sampling and survey, experiments, environmental, fishers' personal logbooks.

2 *Statistics*
Summaries of the data, including graphics.

3 *Models*
All decisions are based on models. These can take many forms. They can be intuitive, diagrammatical, logical (or illogical) and/or scientific. Mathematical models try to capture an understanding of what has happened in the past, explain underlying dynamics and predict alternative futures. Good models include a statement of assumptions and provide measures of degrees of confidence, uncertainty and risk.

4 *Related Information*
Includes all relevant related information including past stock assessments, books, scientific papers, descriptions of similar stocks, etc.

5 *Human Expertise*
The knowledge and skills of experts of various kinds (e.g. fishers, biologists, modellers) associated with the fishery.

The role of a fishery scientist can be viewed as responsibility for this information system. The required tasks include planning, development, collection, maintenance, understanding, description, interpretation, communication, extension, explanation and provision of advice on the fish stock and on how the resulting Fish Stock Accounts relate to other accounts of the fishery (e.g. environmental, economic, financial, etc.).

Effective Fish Stock Accounts

The effectiveness of scientific advice depends on the extent to which the fish stock information system and the Fish Stock Accounts have the following characteristics:

- Meet the needs of all stakeholders
- Easily understandable by all stakeholders
- Complete and integrated
- Transparent and open
- Describe dynamics
- Relevant and balanced, including simplicity and common sense
- Communicate levels of confidence, risk and uncertainty
- Up to date and timely (regular ?)
- Efficient and easily accessible for analysis and viewing
- Secure (i.e. confidentiality, back-up)
- Meet existing standards (e.g. Biological reference points)
- Flexible and connectable to other data bases.

It is easy to identify the shortcomings of most existing fisheries stock information systems by reference to this list.

Stakeholder Relationships

Diagrams can show the relationships between the various stakeholders, data, models, scientific advice and management decision-making. Figures 1 and 2 contrast the old relationships with the new.

Figure 1 describes the old relationships. Scientists obtain most of their data in two ways. Their own sampling and experimentation is costly and therefore often insufficient. Fishers, whose sampling is much more cost effective, only pass on a small fraction of what they collect and know; and even that is often adulterated. Scientists use these sometimes questionable data to develop models that often only they understand and then provide advice to busy managers who are inexpert in fish population dynamics. On the other hand, managers also negotiate with fishers regarding management options. The results are rarely satisfactory.

Figure 2 describes the new relationships. Here, data and knowledge are treated as a common resource fundamental for decision-making, similar to a company's accounts. Data are collected in the most cost effective way, usually by fishers or by contracted specialists. Scientists coordinate collection, prescribe methodology, train data collectors and ensure data quality. Their principal role is responsibility for the Fish Stock Accounts. If these accounts have the characteristics listed above, everyone involved in management finds them relevant and easy to understand. As a result, lack of effective scientific input ceases to be a major barrier to effective fisheries management.

There are concerns that some fishers may adulterate data to achieve short-term gains. However, in the long-term, truth will out.

Conclusions

The development of effective Fish Stock Accounts is an evolutionary process that will proceed in parallel with the transformation of relationships between stakeholders.

Fishers support tough decisions or change their behaviour when they believe it is in their own interests to do so. This is most likely to occur when they have a clear understanding of the financial consequences of alternative actions and they truly feel ownership of the fish stock. Tough decisions will be supported by industry when industry itself trusts the Fish Stock Accounts. So scientists need to recognise and address their roles in relation to consciousness-raising and consensus-building. Their goal should be to develop long-term trusting relationships with the other stakeholders. Important personal skills will be communication, empathy, collaboration and education.

The successful management of fisheries is vital not only to the people whose livelihood depends on them, but also to a world of dwindling natural resources (R.W. Day, personal communication). Achieving tough decisions affecting many participants on the basis of uncertain knowledge is an important general issue. "Solving the basic scientific, economic and social problems of sustainable development is going to become essential for the very survival of our civilisation." (Clark 1990).

References

Clark, C. (1990). President's parting message: keep struggling! *Resource Modeling Association Newsletter* **5**(1), 1.

Francis, R.C. (1990). Fisheries science and modeling: A look to the future. *Natural Resource Modeling* **4**(1), 1-9.

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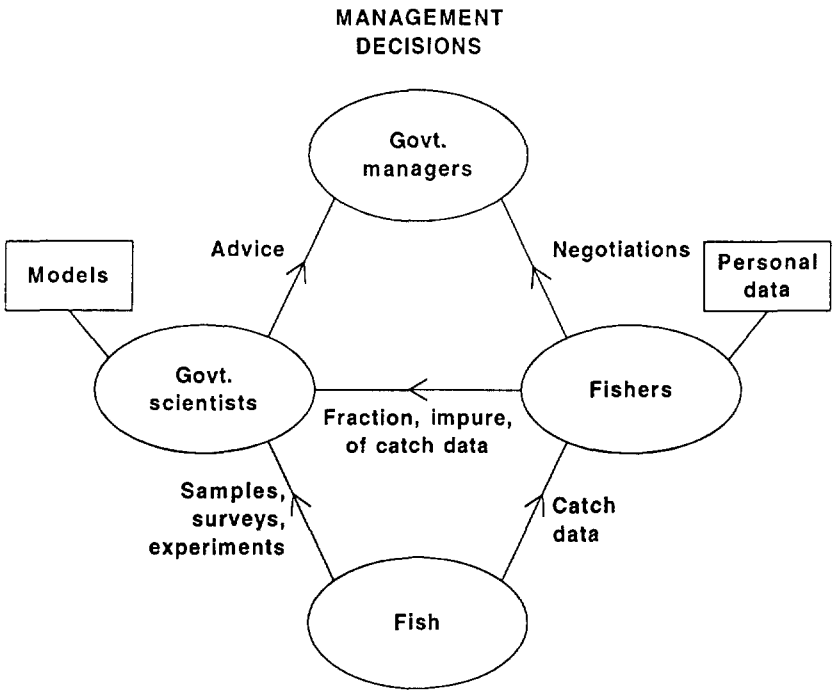

Figure 1. Old relationships between stakeholders, data, models, scientific advice and management decision-making.

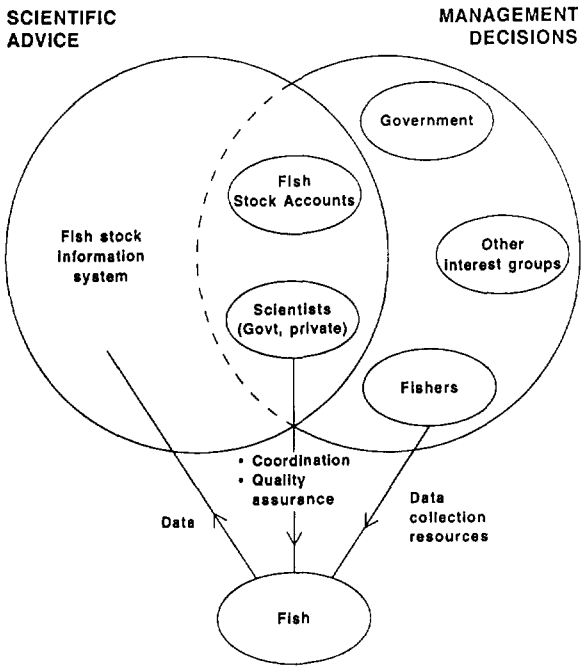

Figure 2. New relationships between stakeholders, data, models, scientific advice and management decsion-making.