5. Towards implementation of the framework

This framework attempts to improve upon conventional assessment and normative management approaches and contemporary thinking by providing a set of flexible options for practical, operational steps to conducting IAA. A number of considerations have converged to provide the rationale and impetus for this initiative. First, the end of the twentieth century has been marked by a large-scale recognition of the poor state of fisheries, largely due to inadequate governance (including research or the provision of scientific support more generally). It has been progressively realized that, overall, SSF have been neglected both by fisheries management and in national development planning. This neglect stems, at least in part, from an underestimation and consequent under-appreciation of their economic value and contribution to broader societal well-being.

Second, underlining the first consideration, a new emphasis on SSF has been urged by the FAO Advisory Committee on Fishery Research (ACFR) in its 2002 and 2003 sessions, and by the FAO Committee on Fisheries in its last three sessions (2003–2007).

Third, if the general research framework for fisheries governance is far from adequate for large-scale fisheries (in particular because of the lack of appreciation for the systemic complexity of the sector), it is especially faulty with regard to SSF. Despite the new and dynamic focus on SSF governance, insufficient attention has been given to the assessment and advisory processes. Approaches and methods are available in the various streams of science engaged with SSF; but they tend to remain isolated in disciplinary silos, in part because of the lack of an agreed interdisciplinary framework. This document sets the first stage in developing a broad consensus on the elements of that framework. It is very much a work in progress, and refinement and clarification will take place as experience in testing approaches and embedding them in fishery governance systems progresses.

PROMOTING THE FRAMEWORK

Decision-makers will need to be convinced that an integrated assessment process is more appropriate and effective than conventional approaches. Raising awareness about the complexity of SSF, the failure rate of fisheries management and the mounting world trade requirements for sustainability (ecolabelling) are pushing national systems in that direction. A number of integrated development approaches (e.g. integrated conservation and development, sustainable livelihoods) or partnership approaches to management (e.g. co-management, community-based management) have been applied, though usually at project as distinct from sector level. The IAA framework has been elaborated to complement these endeavours, not to supplant them.

The success of the framework will be judged by its ability to improve the effectiveness of management actions in the world's small-scale fisheries. As such, the promotion of an IAA framework can best be regarded as a strategic initiative that will take many years to show a tangible impact on indicators of poverty reduction and responsible fisheries.

The relationship between the additional costs of an IAA process and its potential benefits will obviously be a central issue. The "costs" of formally establishing the process (human resources, means and institutional cooperation) may appear high

(particularly in comparison with the nearly non-existent information systems used today for SSF in many places) and the expected benefits will need to be anticipated upfront and demonstrated as soon as possible, for example through pilot projects. Simplifications of the ideal IAA framework might be unavoidable when the SSF value is low but it will be important to maintain its spirit of integration and participation. In any case, the IAA process should generally be able to demonstrate the real value of the SSF sector, thus justifying itself.

IMPLEMENTING THE FRAMEWORK

The implementation of an IAA process requires the development of an enabling environment within which the different streams of information, presently developed separately in different institutions and processes, meet. However, developing an effective two-way participatory science–policy interface for strongly participative governance is a challenge (see Engels, 2005). Analysing informed, science-based decision-making processes and their outcomes in an environmental management arena characterized by high environmental risk, uncertainties and political stakes requires some navigation of scientific evidence, other knowledge perspectives and considerable social and political judgment (Jasanoff, 2004) on behalf of assessors, managers and stakeholders more generally. An effective process requires:

1. Agreement by scientific advisers involved in expert groups to consider traditional knowledge and to participate in the negotiating process leading to decisions, i.e. interacting within the advisory process and assisting in the decision-making process.[9]
2. A dual decision-making process: (i) among scientists within and between disciplines, to resolve scientific uncertainties or divergences that carry political weight and societal costs; and (ii) between policy-makers and stakeholders, including scientists, to decide on the best course of action. Such an integrated process would be ineffective in a context of scientific disagreements, disparate social and political values, or when occurring in an adversarial (judicial) context.
3. "Negotiation" of the boundaries between mandates: (i) around the scientific process to preserve the independence and objectivity necessary for the political acceptability of the advice; and (ii) around the decision-making process, through subsidiarity, devolution, etc. The first point is crucial in a system in which non-scientists and scientists are called to cooperate closely and where the risk for each of them to "cross the line" is high[10] and sometimes advisable. The second is important in a governance system where decision is devolved to lower levels while formal legal liability in relation to UNCLOS remains with the State.
4. Commitment of all actors to moderate their views towards an acceptable societal compromise/position. This requirement recognizes that free-riders or stakeholders with no willingness to reach agreement may stall the process.

Jasanoff notes in addition that the outcome of the process should be a state of knowledge that satisfies the test of scientific acceptability and supports reasoned decision-making, while assuring those exposed to risk that their interests have not been sacrificed to scientific uncertainty. The existence of a formal and transparent process of this type, in the long term, may produce scientifically robust knowledge (*sensu* Gibbons, 1999) and help maintain credible and relevant scientific excellence, while reducing the need for "underground" political pressure.

For some scientists involved in SSF assessment and management, this may sound excessive and it would be sufficient that the assessment process leads to an

[9] This recognizes that final decisions are a matter of societal choice.

[10] With stakeholders tempted to interfere with scientific interpretation of facts and scientists tempted to play a role in objective setting or decision-making.

implementable decision with high probability of making things better. It is very hard to see, however, how such a high probability to make the right decision (the one that will make things better) can be obtained without the rigour of scientific analysis. Using a pure trial and error approach, taking only the consensus as the criterion as opposed to scientific validity implies accepting high (and non-assessed) risks for both the people and the resources.

WORKING ACROSS DISCIPLINES

Co-evolution of science and governance requires the simultaneous existence of a supply of science and a demand for governance. This implies that the policy-makers and managers request explicitly – and provide the conditions for – a more comprehensive form of advice. This also implies that the present purely operational horizon of management is complemented by a strategic one, with a more complete set of objectives, a multiscale and multistakeholder vision and a more democratic process. Finally, this implies a change in fishery research development policy, aiming at a closer collaboration if not integration between the social and biophysical sciences, e.g. changing the recruitment patterns in fishery research centres, providing incentives for interdisciplinary strategic analysis (to attract academics in the decision-making area) and to foster the joint development of comprehensive models (including agent-based simulation models and games). These changes do not need to happen all at once. Progressive changes are more pragmatic and more likely to be adopted, as shown in the countries where processes of this nature have already started to function.[11] A wide interdisciplinary collaboration around simulation platforms and integrated advisory processes may lead to the development of a transdiscipline (*sensu* Flinterman *et al.*, 2001) but the transition to that ideal will necessarily be pragmatic. The implications of integrated assessment for fisheries departments and how change might take place are discussed in more detail by Bavinck *et al.* (2005) and in the book, *Fish for life*, by Kooiman *et al.* (2004).

EMPOWERING STAKEHOLDERS

Because of the interconnectedness within and between ecosystems, the number of stakeholders potentially involved could be overwhelming. Stakeholders include researchers, managers and decision-makers, policy-makers, representative organizations (e.g. NGOs) and, obviously, end-users. A high level of participation of the latter is essential for a democratic process. User-centred simulations allow the end-users to participate actively in rerunning the simulations exploring differing scenarios, usually proceeding by iteration.

Funtowicz and Ravetz (1990) argued for participation in the process *of all those with a desire to participate in the resolution of the issue*, a proposal raising non-trivial problems of monetary and non-monetary interaction cost and effectiveness. A central problem is that of striking a balance between the broadest possible representation and affordable interaction costs. Once the stakeholders have been defined, it is important to define the roles that they are called (and are willing) to play (e.g. right holders, stewards, providers of data and traditional knowledge, scientific "assistants" in model development, or actors in a simulation game). As these roles are demanding, however, it is important to ensure that the stakeholders involved are motivated in order to maintain their commitment to the process.

HOW MUCH COMPLEXITY IS ENOUGH?

Chapter 1 illustrates the complicated structure of a SSF system with many interacting components (Figure 1). The large number of interactions between the components,

[11] For implications of integrated approaches for fisheries departments and for their evolution, refer to Bavinck *et al.* (2005) and Mahon, Bavinck and Roy (2005)

with non-linear positive and negative feedback controls (respectively amplifying or attenuating effects), not represented in the figure, create a high degree of complexity in a system, the understanding and control of which, as a consequence, can only be partial and dynamic. The successive adoption of the concepts of sustainable development, the precautionary approach and ecosystem approach since the early 1990s, signal a progressive recognition of the fact that fishery systems are complex social-ecological systems (*sensu* Berkes and Folke, 2000) and should be managed as such. There is an obvious gradient of increasing complexity from the open sea to the coastal zone, estuaries and deltas where so many SSF, large-scale fisheries, aquaculture systems, other economic industries and societal requirements interact. A similar gradient may exist between lowly populated mountains and coastal areas, lake shores or flood plains. This complexity, combined with the low capacity available for research and management, has sometimes led managers to question whether SSF can be managed at all (in the conventional sense, with State intervention) or should be left to themselves, implicitly accepting consequences as unavoidable.

However, Holling (1978, 1986, 2000) has underlined the difference between complication and complexity, stressing that highly complicated systems, in the end, might be driven less by the complex interactions between their components than by a few external drivers (e.g. demography, market, political stability), which should be the priority focus.

Finding the level of complexity beyond which the effort is counter-productive is a challenge (Garcia and Charles, 2007). The IAA system is highly integrative and participative but this has costs that can become prohibitive and stall decision-making mechanisms. Recognizing these difficulties and adding the problems hindering interdisciplinarity, how far should the integration process go? One could wonder (with Strand, 2003) to what extent the introduction of new embryonic approaches and instruments, the effectiveness of which is still to be fully tested, is preferable to continued use of the present well-tested approaches and methodologies, patching the system to mitigate its shortcomings. The losses in the present system, however, are sufficiently well established and the business-as-usual perspectives are so bleak that there seems to be little alternative to trying new approaches in SSF, some of which have been extensively tested in other fields.

One might argue that fisheries sustainability is a mature enough issue to be dealt with within shorter time frames. The issue is well established. Its causes have been abundantly described, analysed and agreed. A number of approaches to resolving the problem have already been tested under various conditions. A global scale agreement is available through the Code of Conduct for Responsible Fisheries. The ecosystem and precautionary approaches have already been adopted. However, resolution of the sustainability issue through such approaches at local, national and regional levels, where real decisions are made, is highly problematical. If the process is to be mounted in a strongly participative fashion, it would certainly require more time than a conventional assessment. As a consequence, an IAA process would probably be best suited for elaborating multiyear strategic frameworks for fisheries, within which the more operational management procedures would be implemented. Notwithstanding, many of the integrated features of IAA (interdisciplinarity and participation for example) will absolutely need to be implemented even in short-term crisis-based assessments.

COHERENCE WITH UNCLOS

The Convention requires that decisions be based on the best scientific evidence available – a requirement sometimes considered as an "elitist" mode of operation (Toth, 2003) as it may be interpreted as not using non-scientific (i.e. traditional) knowledge. Although a number of subsequent instruments, explicitly related to it, have added the

requirement to include other forms of knowledge (particularly traditional knowledge) as a basis for decision-making, the fundamental requirement for the scientific nature of the information remains. As a consequence, while necessarily drifting towards a broader knowledge-building processes, the enquiry process will need to remain demonstrably scientific if a collapse of the decision-making process is to be avoided (Jasanoff, 2004).

CHECKS AND BALANCES

Closely involving stakeholders in the complex exercise of fisheries assessments for decision-making has obvious advantages already mentioned, e.g. increased legitimacy, compliance, reduction of the danger of voluntary or inadvertent "manipulation" by industry, the central administration or the scientists. However, deep participation also reduces the opportunity of independent oversight, particularly of the overall performance of the IAA system itself. The solution to this dilemma may be in the introduction of additional checks through:

- repetition of the participative modelling (where relevant) and assessment exercise, at intervals, e.g. in line with the adaptive management principles, to detect mistakes or unexpected and undesirable changes; and
- use of additional peer review, e.g. by panels composed of both scientific and industry experts external to the IAA process.

CHRONIC INFORMATION DEFICIT

The scoping phase of the diagnostic or assessment process is most effective when data can be readily accessed. Data on small-scale fisheries are, however, notoriously patchy. The kind of basic information that many rural development economists and environmental managers take for granted when studying land-use change or response of crop yields to rainfall variation is simply not available at resolutions that differentiate fisheries from the wider agricultural economy (e.g. in demographic censuses, fishers are grouped with farmers in most countries). Similarly, national poverty surveys usually rely on some kind of random sampling procedure, so that it is very unlikely that any fishing-dependent communities are included

Some progress towards correcting the SSF information deficit has been made, however. Examples include (i) linking fishery statistical systems to the statistical systems used to generate national accounts in West Africa (Kebe and Tallec, 2006); (ii) work through the global FAO FishCode STF Project, which aims at improving information on status and trends in capture fisheries (www.fao.org/fi/fishcode-stf.htm); (iii) the FAO/WFC/World Bank "Big Numbers Project", which aims at highlighting the importance of small-scale fisheries in terms of their contributions to employment and food fish production, as well as the efficiency of their operations; and (iv) for marine fisheries, the "Sea Around Us" project, which is attempting to compile catch-effort statistics relating to the small-scale sector (www.seaaroundus.org).

TOWARDS IAA IMPLEMENTATION: NEXT STEPS

The present document represents a first step towards development of an IAA framework and a toolkit for its implementation. SSF researchers and practitioners need to be involved in consultation and empirical testing of the framework in order to carry this development forward. Next steps will be to synthesize the lessons learned on SSF assessment and awareness-raising through a series of case studies,[12] and to test the IAA framework in the field. On this basis, an assessment resource kit of methodologies, approaches and practical measures will be assembled for use (and further testing and refinement) by assessors, managers and stakeholders when designing and undertaking an IAA process for different small-scale fisheries (Figure 17)

[12] FAO started preparations to collect such case studies in May 2008.

FIGURE 17
Pathway of the development of a toolbox for the integrated assessment of SSF