FAO TECHNICAL GUIDELINES FOR RESPONSIBLE FISHERIES

3

INTEGRATION OF FISHERIES INTO COASTAL AREA MANAGEMENT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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PREPARATION OF THIS DOCUMENT

This document has been prepared by staff in the Fishery Development Planning Service, Fisheries Department, FAO. Mr. David Insull, Senior Officer in the Service, was directly responsible. The first draft was written by Dr. Stephen Cunningham, then of the University of Portsmouth, UK.

Consistent with the recommendations of COFI, the draft Guidelines were provided for information to the Technical Consultation on the Code of Conduct for Responsible Fishing, Rome, 26 September - 5 October 1994. Subsequently, the draft text was submitted for peer review.

The Guidelines are preliminary and will be evaluated and revised as information becomes available through their use in the implementation of Article 10 of the Code.

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ABSTRACT

Marine fisheries, as well as fisheries in large lakes, depend on the coastal area in a variety of ways. Most capture fisheries are based on coastal stocks; others exploit offshore stocks which spend part of their lives in inshore waters, e.g., in a nursery or feeding area. Fish stocks also rely on primary productivity in the coastal area as an important part of the food chain. Coastal aquaculture is also heavily dependent on the coastal area for space and resources.

This dependency of the marine fisheries sector on the coastal area makes it particularly susceptible to activities which result in coastal environmental change which may have major impacts on the sector. At the same time, the fisheries sector can affect other coastal activities, e.g., through competition for space. The need is apparent, therefore, to consider the development and management of the fisheries sector within the context of coastal area management and development planning, i.e., in the context of the protection and management of the resources, the environment and the activities of the coastal area.

These Guidelines are provided as explanatory material to Article 10 in the Code of Conduct for Responsible Fisheries. Article 10 concerns the Integration of Fisheries into Coastal Management in order to assist in achieving the rational use of scarce coastal resources. In particular, they address the issue of how the fisheries sector can be integrated into coastal management planning so that interactions between the fisheries sector and other sectors can be taken into account in the establishment of management policy and practice with regard to coastal resources.

The Guidelines are addressed to all who are interested in improving the use of fisheries resources in the coastal area. The Code sets out actions which are required at the level of national government or of the authorities responsible for fisheries. However, resource users have a role to play in the planning process, not least in making clear the different valuations placed upon the resource.

Integrated coastal management (ICM) usually refer to the process of resources management in the interface between the sea and the land, but the principles of integrated management also apply to the water/land interface of large inland water bodies.

The fisheries sector is taken, in the Code and these Guidelines, to refer to both capture fisheries and aquaculture, unless one or other sector is specifically mentioned.

These Guidelines contain the Provisions of Article 10 of the Code of Conduct, in bold, followed by the related explanations and considerations.

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BACKGROUND

1. From ancient times, fishing has been a major source of food for humanity and a provider of employment and economic benefits to those engaged in this activity. However, with increased knowledge and the dynamic development of fisheries it was realised that aquatic resources, although renewable, are not infinite and need to be properly managed, if their contribution to the nutritional, economic and social well-being of the growing world's population was to be sustained.

2. The adoption in 1982 of the United Nations Convention on the Law of the Sea provided a new framework for the better management of marine resources. The new legal regime of the oceans gave coastal States rights and responsibilities for the management and use of fishery resources within their EEZs which embrace some 90 percent of the world's marine fisheries.

3. In recent years, world fisheries have become a dynamically developing sector of the food industry and coastal States have striven to take advantage of their new opportunities by investing in modern fishing fleets and processing factories in response to growing international demand for fish and fishery products. It became clear, however, that many fisheries resources could not sustain an often uncontrolled increase of exploitation.

4. Clear signs of over-exploitation of important fish stocks, modifications of ecosystems, significant economic losses, and international conflicts on management and fish trade threatened the long-term sustainability of fisheries and the contribution of fisheries to food supply. Therefore the Nineteenth Session of the FAO Committee on Fisheries (COFI), held in March 1991, recommended that new approaches to fisheries management embracing conservation and environmental, as well as social and economic, considerations were urgently needed. FAO was asked to develop the concept of responsible fisheries and elaborate a Code of Conduct to foster its application.

5. Subsequently, the Government of Mexico, in collaboration with FAO, organised an International Conference on Responsible Fishing in Cancún, in May 1992. The Declaration of Cancún endorsed at that Conference was brought to the attention of the UNCED Rio Summit in June 1992, which supported the preparation of a Code of Conduct for Responsible Fisheries. The FAO Technical Consultation on High Seas Fishing, held in September 1992, further recommended the elaboration of a Code to address the issues regarding high seas fisheries.

6. The One Hundred and Second Session of the FAO Council, held in November 1992, discussed the elaboration of the Code, recommending that priority be given to high seas issues and requested that proposals for the Code be presented to the 1993 session of the Committee on Fisheries.

7. The Twentieth Session of COFI, held in March 1993, examined in general the proposed framework and content for such a Code, including the elaboration of guidelines, and endorsed a timeframe for the further elaboration of the Code. It also requested FAO to prepare, on a "fast track" basis, as part of the Code, proposals to prevent reflagging of fishing vessels which affect conservation and management measures on the high seas. This resulted in the FAO Conference, at its Twenty-seventh Session in November 1993, adopting the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, which according to FAO Conference resolution 15/93 forms an integral part of the Code.

8. The Code was formulated so as to be interpreted and applied in conformity with the relevant rules of international law, as reflected in the United Nations Convention on the Law of the Sea, 1982, as well as with the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995, and in the light of *inter alia* the 1992 Declaration of Cancún, the 1992 Rio Declaration on Environment and Development, in particular Chapter 17 of Agenda 21.

9. The development of the Code was carried out by FAO in consultation and collaboration with relevant United Nations Agencies and other international organisations including non-governmental organisations.

10. The Code of Conduct consists of five introductory articles: Nature and Scope; Objectives; Relationship with Other International Instruments; Implementation, Monitoring and Updating; and Special Requirements of Developing Countries. These introductory articles are followed by an article on General Principles which precedes the six thematic articles on: Fisheries Management, Fishing Operations, Aquaculture Development, Integration of Fisheries into Coastal Area Management, Post-Harvest Practices and Trade, and Fisheries Research. As already mentioned, the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas forms an integral part of the Code.

11. The Code is voluntary. However, certain parts of it are based on relevant rules of international law, as reflected in the United Nations Convention on the Law of the Sea of 10 December 1982. The Code also contains provisions that may be or have already been given binding effect by means of other obligatory legal instruments amongst the Parties, such as the Agreement to Promote Compliance with Conservation and Management Measures by Fishing Vessels on the High Seas, 1993.

12. The Twenty-eighth Session of the Conference in Resolution 4/95 adopted the Code of Conduct for Responsible Fisheries on 31 October 1995. The same Resolution requested FAO *inter alia* to elaborate as appropriate technical guidelines in support of the implementation of the Code in collaboration with members and interested relevant organisations.

1. Institutional Framework (Article 10.1)

"States should ensure that an appropriate policy, legal and institutional framework is adopted to achieve the sustainable and integrated use of coastal resources, taking into account the fragility of coastal ecosystems and the finite nature of their natural resources, and the needs of coastal communities." (Article 10.1.1)

13. In considering the integration of fisheries into broader coastal area management, the first requirement is for the State to establish policy, legal and institutional frameworks for the integrated management of coastal areas.

14. Increasingly, the basic policy framework within which coastal area management is discussed is one of ecologically sustainable development. This framework establishes the range of

policies which will be considered ecologically sustainable; the management problem is how to decide between them, taking into account local conditions, including social and economic considerations.

15. The fundamental problem in coastal area management is one of resource allocation. Coastal resources are becoming increasingly scarce due to a combination of economic development and increased population in coastal areas. In common with other resources, the scarcity of coastal resources requires that choices be made between different uses. Coastal area management involves establishing a framework within which such choices might be made and the resultant policies implemented.

16. However, the coastal area has a number of features that complicate such choices. First, it is a dynamic system where physical, ecological, social and economic processes interact; coastal management planning needs to take account of these various dynamic processes. Second, the fluid nature of a number of coastal resources complicates the allocation of these resources. Third, the local and regional character of resources may complicate policy co-ordination between different agencies.

17. Where it is possible, the valuation of different development and or conservation options (the issue of valuation is referred to further in 10.2.2 below) provides a sound basis for policy formulation.

18. In ICM a holistic approach is necessary. In the management of coastal resources, care has to be taken to avoid a narrow sectoral approach where this is likely to be inadequate. For instance, artisanal fisheries may be very difficult to manage unless there is economic development on-shore creating alternative employment opportunities. There are many other areas where a co-ordinated approach to policy making is required.

19. To obtain this type of approach, an institutional framework is required which provides the appropriate linkages between national, regional and local authorities. There is a spectrum of approaches adopted by countries to provide such a framework. At the beginning of the spectrum, an existing agency may be given a mandate to initiate cross-sectoral coastal planning but with no additional responsibilities or powers. Although this approach may result in an initiation of cross-sectoral coastal planning, it is likely to be rarely effective in the long term. Further along the spectrum, some countries have adopted an approach under which the different agencies involved in coastal management retain all their responsibilities but co-ordinates their planning and actions through a central body; the mandates of such bodies varies considerably. Finally, countries may adopt a truly integrated approach within which much of the responsibility for planning and the allocation of resources is undertaken by an integrated institution; such an institution may be either an existing organization which has been provided with enhanced powers to mediate or, alternatively, a new institution.

20. In setting up an effective management framework, an institutional analysis is necessary in which, *inter alia*, the roles and responsibilities of different agencies should be analyzed and, if necessary, revised, so that, on the one hand, overlapping or conflicting jurisdiction is minimized and, on the other, there are no important issues for which there is not a responsible agency. An institutional mechanism for ICM, therefore, will ensure the following: first, that appropriate sectoral responsibilities are defined; second, that appropriate co-ordinating/integrating

arrangements are established; and third, that agencies at all levels are kept informed of coastal area policies to ensure coherence in policy implementation.

21. A legislative framework is required which legitimises coastal management institutions and the actions undertaken by them. The exact nature of the legislation in any country is dependent on the coverage and gaps in the existing legislation. Moreover, one country's experience need not be directly transferable to another, even when the countries share similar social, political , economic and cultural backgrounds.

"In view of the multiple uses of the coastal area, States should ensure that representatives of the fisheries sector and fishing communities are consulted in the decision-making processes and involved in other activities related to coastal area management planning and development." (Article 10.1.2)

22. Very often, the fisheries sector competes in the coastal area with other sectors for space, both on land and water, both for its directly productive activities - fishing and coastal aquaculture - and for the handling, processing and distribution of production. As a consequence, the authorities in charge of fisheries and the fisheries sector must participate in decisions regarding the development in the area. In this regard, an aspect of the dependence of the sector on the coastal environment, is the significant role of fishermen and fishfarmers as an observers of the coastal environment; fishers and coastal fishfarmers are usually the first to note the impacts of many changes which might occur in the aquatic environment as a result of pollution or other causes

23. A summary of the major impacts on fisheries resulting form activities in other sectors are shown in Box 1.

24. A way in which the adequate representation of fisheries interests can be ensured, is to designate an authority, or authorities, for fisheries which has/have both sectoral and inter-sectoral responsibilities; the stronger is the institutional structure that is adopted for the fisheries sector, the more effectively fisheries interests can be represented.

25. The nature of the sector which makes it especially susceptible to environmental changes resulting from on-shore activities may result in different and conflicting interests with land-based sectors such as the agriculture sector. Moreover, the issues facing capture fisheries, and to a lesser extent aquaculture, are not the same as those facing the agricultural sector. In particular, the agricultural production model - in which increased inputs result in higher production - cannot be applied to the fisheries sector. There may, therefore, be persuasive arguments why a fisheries agency should not be part of another Ministry or Department where there may arise situations of conflicting interest.

Box 1: Some impacts on fisheries resulting from activities in other sectors

Pollution: This may come from land-based sources, e.g., industrial or agricultural waste dumped into rivers and carried to the coastal area, pesticide and fertiliser run-off into rivers, and sewage, or sea-based, e.g., oil spills and ocean dumping of toxic waste. Some pollution may result in an increase of productivity of coastal areas but very often it will result in its decrease. In severe cases there may be a risk to human health, e.g., through the concentration of toxic waste by shellfish. Decreased productivity will adversely affect the financial health of the fisheries sector. The fisheries sector may itself contribute to coastal pollution, e.g., via oil pollution from fishing vessels, effluent from fish processing plants and by intensive aquaculture systems resulting in organic and nutrient enrichment of the seabed and sometimes of the water column. Generally, however, the fisheries sector suffers from rather than causes pollution.

Habitat degradation: This may occur directly, e.g., as a result of mangrove clearance for various activities, coral mining, or indirectly, e.g., by sedimentation of seagrass beds and reefs due to soil run-off associated with, for example, deforestation or poor land-use practice. As with pollution, habitat degradation will affect the financial well-being of the fisheries sector. Some habitat degradation may be related to the fisheries sector itself, for example, fishing with explosives or toxic substances, and mangrove clearance and use of chemicals for aquaculture development.

Spatial conflict: This may occur where coastal fisheries and aquaculture have insecure property rights and are gradually squeezed from their traditional areas by other coastal developments (especially urban sprawl and tourism development).

26. Given the importance of the coastal area to the fisheries sector, it is essential that the designated authorities for fisheries be included in the coastal management planning process. For instance, the fisheries authorities should be included in the review process for environmental impact assessment where projects have a potential impact on coastal waters; they should be involved when permits for construction are being issued for the coastal area, and consulted on possible fisheries impacts; they should be involved in the drafting of laws and regulations with respect to the coastal area; and they should be involved in the spatial planning process where this may impinge upon fisheries interests, e.g., port development; most importantly, they should be included in an integrated coastal management planning process.

27. In many cases, coastal fisheries may be most easily managed at a local level within an overall framework established at national or regional level. In many countries, therefore, fisheries authorities will be most effective in inter-agency negotiations if an appropriate framework of national, regional and local authorities is established to ensure that fisheries management can be implemented at the appropriate level.

28. As with coastal management generally, an important function of the fisheries authorities is to ensure that all levels of administration are sufficiently well informed and motivated so that common goals are pursued. The various levels of management constitute what is termed here the "fisheries authorities". The authority held at each level will be determined on a case-by-case basis.

29. It is important also that the fisheries authorities should establish mechanisms to work with all stakeholders in the fisheries sector so that the sector may be adequately represented in inter-agency discussions where cross-sectoral impacts are being considered. Stakeholders are considered here to be those who are recognized by the government as having an interest in the sector.

"States should develop, as appropriate, institutional and legal frameworks in order to determine the possible uses of coastal resources and to govern access to them taking into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development." (Article 10.1.3)

30. A major cause of problems in coastal area management is the free and open access to coastal renewable resources. This has long been recognised as a problem in the fisheries sector but also affects many other coastal resources, particularly water, space, and primary productivity.

31. It is important that where there is free and open access to coastal fisheries resources that this regime is replaced as soon as possible by one based on exclusive use rights. There are a number of reason which take into account not only the inefficiencies generated within the sector by open and free access but also because of the interaction with other sectors in the coastal area. If the fisheries sector remains open access then it may be difficult to persuade other agencies and resource users to restrict their activities in favour of fisheries since any incremental benefits will be dissipated in the same way as resource rents. Conversely, as fisheries mover towards an exclusive rights-based regime, it is essential that they can operate in an overall rights-based system of coastal resources development.

32. Fisheries are not the only open access resource in the coastal area. Often access remains free and open to key resources such as mangroves and coral reefs and to the coastal sea as a sink for waste. As a result, other users of the coastal area may have a significant negative effect, not only on the fisheries sector in the form of, for example, habitat destruction, aquatic pollution, but also on other valuable functions of the ecosystems.

33. Two broad approaches exist to deal with sectoral conflict - regulatory and economic. Both approaches may have the same objectives. The difference is the way in which they attempt to achieve their aims. Regulations restrict legally what may be done, whereas economic approaches seek to provide incentives or disincentives to encourage appropriate behaviour. Economic methods have a number of advantages, notably in that they allocate scarce resources efficiently within a market framework. However, they are often difficult to apply and in many situations it is often necessary to adopt a regulatory approach, sometimes complemented by economic policy instruments. A brief overview of regulatory and economic methods is shown in Box 2.

Box 2: Regulatory and economic policy instruments

Regulatory measures control the use of resources through prohibitions or restrictions. They might include, for example, process or product regulation, banning or restricting polluting activities, and restricting production activities, e.g., use of certain fishing gears, fishing practices, season, area, time. The common feature of these regulations is that non-compliance results in penalties.

Often, the main problem in a regulatory approach is that of enforcement. In the absence, in many countries, of adequate means of enforcement, it may be considered to be preferable to not introduce regulation which cannot be enforced. Another problem with regulation is that of ensuring that it remains sufficiently flexible to deal with the range of situations which are likely to occur. One way of dealing with this possible difficulty is to supplement regulation with a process of negotiation and facilitation between interested parties with a view to ensuring the smooth evolution of regulations.

The economic approach might use a number of instruments, e.g., charges (user charges, effluent charges), subsidies, market creation (tradable permits), deposit refund systems, and financial enforcement incentives (non-compliance fees and performance bonds).

The main advantage of economic approaches, if they can be implemented, is that they bring the issue of coastal resource allocation into the same framework which is used to resolve resource allocation issues generally within the economy. Even if the approach can be only partially implemented, it often increases the flexibility of the management system, e.g., it may be easier to revise charges to different users than to change regulations affecting them. A not insignificant advantage of the economic approach is that it can be used to generate funds to offset some of the cost of management.

34. The same solution to the removal of open access is not applicable everywhere, even within the same country. The best solution will be dependent wholly upon the circumstances - the nature of the resource, institutional arrangements, both current and historical, the objectives, and so on. Moreover, the best solution may change over time. Governments, therefore, need to be clear about what they are trying to achieve and to examine a range of possible solutions before deciding on the best choice; there is also a need to remain flexible, so as to be able to respond to changing circumstances.

35. One aspect of open access is that resource users have been unable to gain recognition by the State of their rights over resources. Frequently, this has resulted in traditional and customary fishers and fishfarmers being disadvantaged when other resource users become dominant. An illustration is shown in Box 3. Where legal regimes are sufficiently flexible to recognize and integrate local customary perceptions of rights and duties, States might find it desirable to give a *de facto* recognition of resource rights. Where the legal regime does not permit this approach, States might wish to amend their legislation accordingly. At the same time, the fisheries authorities

should establish conditions which require that fishers and fishfarmers recognize and respect the ecological constraint imposed by the coastal environment.

Box 3: Rights of traditional and customary fishers and fishfarmers to an acceptable environmental quality

Where markets for environmental goods within the coastal area, e.g., the natural productivity of coral reefs, have not existed, fishers using those reefs have been unable to secure the rights necessary for their future well-being and are vulnerable to their productivity being threatened by other users, e.g., tourism, coral mining. Small-scale coastal aquaculture has also long been a traditional and sustainable practice in many countries which may be displaced by industrial operations.

36. Such measures would protect the environment and give traditional and customary resource users the right to a certain level of environmental quality as part of their livelihood.

37. Traditional or customary resource users may have developed access arrangements in response to seasonal changes which affect the availability of fish or determine the timing of major agricultural operations, such as sowing and harvesting. Management plans formulated by planners for any one resource that fail to take account of such strategies may have serious economic and social consequences.

"States should facilitate the adoption of fishing practices to avoid conflict among different fisheries resource users as well as with other users of the marine environment." (Article 10.1.4)

38. Conflicts may arise between fishers from different places wishing to fish in the same area, between fishers using different gears, between commercial fishermen and sport fishermen, between artisanal and industrial fishers, between fishers and fishfarmers and between these and tourism operators, all competing for space and resources, and in many more situations.

39. Conflicts within the fisheries sector itself might be dealt with by area allocations resulting in clear resource allocations (where a resource occupies a particular area) or in reduction of conflict between groups (when a resource moves between areas) e.g., trawling zones, pot areas, etc., by controls on inputs, such as gear limitations or by time, or by output controls, such as quotas. Authorities should also consider the establishment of fishers' and fishfarmers' committees, by fishery area or by fishery, as appropriate, where such problems should be discussed and, if possible, resolved.

40. Inter-sectoral conflict is typically more difficult to resolve than intra-sectoral disputes, although the solutions may be similar. Fisheries authorities should represent the interests of the fisheries sector in negotiations with other agencies to ensure that other sectors respect the interests

of fishers and aquaculturists. When required, the fisheries authorities and fishermen should have the possibility to have recourse to law to protect their interests.

41. Zoning is a common approach in the resolution of inter-sectoral differences involving fisheries, especially using a mixture of time and area restrictions. Economic measures may also have a role.

"States should promote the establishment of procedures and mechanisms at the appropriate administrative level to settle conflicts which arise within the fisheries sector and between them and other users of the coastal area." (Article 10.1.5)

42. Potential conflict should be anticipated and pre-empted when possible. Fisheries sector development and management plans are frequently drawn up from the perspective only of the fisheries sector or even for only one stock. The fisheries management authority should consider explicitly to what extent interactions with other fisheries or sectors are likely to occur. Where they are considered of potential or actual importance, such interactions should be considered within the plans, and action to deal with potential conflict should be taken.

43. In coastal area management, one of the most important institutional and legal functions is to ensure that there is a mechanism for conflict resolution. As coastal resources become increasingly scarce, there is a need to consider how to resolve competing claims, both existing and future, between sectors. Even if the fisheries authorities are consulted on planning issues, conflicts may still arise, providing a need for a mechanism for their resolution.

44. It will be necessary that the fisheries authorities adopt an active role in the identification of the scale of any problem which affects the aquatic environment and its source. An appropriate monitoring system is essential for this task. This is considered further in section 10.2.4 below. Also, when fisheries authorities work closely with fishers and fishfarmers, they are able to more quickly identify changes in ecological conditions, even if it may prove more difficult to identify those responsible.

2. Policy Measures (Article 10.2)

"States should promote the creation of public awareness of the need for the protection and management of coastal resources and the participation in the management process by those affected." (**Article 10.2.1)**

45. An adequate public contribution to the decision-making process (e.g., resource-use decisions) ensuring there is broad support for proposed plans, can be facilitated through the institutional process and legal framework. Legislators and planners should be aware that measures which alienate those most affected by them, are unlikely to succeed in the long term.

46. A significant public input is especially important at the local level where the involvement of resource users and other stakeholders in the planning and management process will increase compliance, reduce the risk of errors in decision making and reduce alienation. This input requires the awareness and participation of stakeholders - or consultation with them as is appropriate to national conditions - in the political process at all levels, national, regional and local, to ensure that their interests are properly represented. Typical approaches include the creation of

consultative committees, the use of discussion papers, and public meetings prior to legislation, the use of public media and the active role of NGOs.

47. The nature of the fishing activity, however, especially in marine capture fisheries where the hours tend to be long and unsocial, may make it difficult for fishers to participate effectively in the political process and may place them at a disadvantage compared to other coastal resource users who are able to exert more effective pressure in the political process. This difficulty may be met through encouragement by the State of the formation of fishermen's organisations. These would represent the views of fishers and the appropriate legal framework would ensure there was a mechanism to allow these organizations a voice in the decision-making process. The organizations would also provide a means to ensure that fishers are informed of important consultative events and able to attend, or at least have their views represented.

"In order to assist decision-making on the allocation of coastal resources, States should promote the assessment of their respective value, taking into account economic, social and cultural factors." (Article 10.2.2)

48. The current and potential (optimally-managed) economic value of resources should be considered, taking account of the interests of non-users and future generations as well as current user groups. The relevant quantity to be considered is the total economic value. Such a valuation may be derived from the identification within any resource or ecosystem of its use, option and existence values. In order to arrive at such a value it is essential that the different goods and services being provided by the coastal environment be clearly identified. Where there is no market for them, valuation techniques must be used, e.g., contingent valuation and hedonic pricing. Some of the issues relating to resource valuation are referred to in Box 4.

"In setting policies for the management of coastal areas, States should take due account of the risks and uncertainties involved." (Article 10.2.3)

49. In the fisheries sector, it is appropriate that the fisheries authority identify potential threats and ensure that the appropriate action to protect fisheries interests is taken. The appropriate response is to attempt to protect the fisheries sector from damage by pre-emptive action. Where such damage does occur, e.g., resulting from a pollution incident, or where a conscious decision is taken at government level that costs to a fisheries sector are offset by benefits occurring elsewhere, action should be taken to rehabilitate the system and there should be adequate compensation to the stakeholders in the fisheries sector.

50. The term "risk" is often used where the precise outcome of an action is unknown but there is sufficient information to determine the probabilities of the likelihood of different possible outcomes; in this sense, risks, therefore, can generally be covered by insurance.

51. The term "uncertainty" is sometimes used to describe a situation where there is insufficient information for the probabilities within the range of possible outcomes to be calculated; it is not, therefore, insurable. Even within uncertainty, different categories might be distinguished. Pure uncertainty might be said to exist where it is impossible even to identify the range of possible outcomes following some course of action.

52. It is important, however, that despite the difficulties which they may give rise to, risks and uncertainties be taken into account without leading to a paralysis of policy. This may be done through various adaptations of the precautionary approach (See the related fisheries management Guidelines). Underlying and providing the basis for the State's response to risk and uncertainty is the necessity of there being an appropriately flexible legal framework.

Box 4: Valuation of coastal resources

An important element of coastal area management is the need to find some common standard against which to compare the implications of different decisions. Essentially, this involves valuing resources to determine the cost of any impact which will, in turn, enable judgements to be made concerning the best use, possibly for a number of potential uses. The most important thing for rational resource use is that a consistent and objective approach is adopted in making sometimes difficult judgements.

A number of problems may arise in the valuation of coastal resources. First, such resources may be undervalued because the full range of goods and services that they provide is not adequately recognised. Such under valuation typically occurs where some of the goods and services are provided outside the market system. For example, in the case of mangrove, attention may be focused on the value of the site for conversion to shrimp ponds rather than on the mangrove's ecological functions, such as their role in providing a fish habitat or in providing protection against storms and cyclones.

A second difficulty is that the value of coastal resources may be affected by actions in another sector. Such effects are called externalities. These may occur in a positive way, for example a power station emitting clean warm water might have a positive impact on shellfish production in an area. However, generally, the impact is negative, for example pollution may reduce the productivity of coastal resources.

Correct valuation of resource use must take into account all elements of value, not just those elements for which markets happen to exist. The fact that a resource is not traded in a market does not mean it is of no value (consider for instance clean air).

53. In many cases, although it may be impossible to assign probabilities to possible outcomes (risk), at least the range of most likely outcomes is known. In appropriate cases and, similarly, where there exists risk, it might be possible to proceed but to use a deposit-refund system, or require the firm or other entity seeking to make the intervention to purchase a bond at least equal to the value of the damage which may occur.

54. This kind of approach recognises risk and uncertainty and uses economic tools so that the appropriate parties have an incentive to reduce any detrimental effects. Its main benefit is that

it encourages prevention rather than clean-up, with firms being given a strong incentive to invest in benign technology compatible with the local situation.

55. Another way of dealing with this problem is to take into account the benefits which would be foregone by a development intervention. Suppose that an activity is proposed that will destroy an area of mangrove. The cost of not proceeding with the activity, in terms of the benefits foregone, gives an indication of how great the current use benefits of the mangrove would have to be in order to offset the benefits of the proposed activity. In many cases, it will be shown that the values of such activities are quite low, supporting the intuitive case against destructive development. If, however, this is judged insufficient evidence, then the total economic value - the sum of the use, option and existence values - of the mangrove would have to be calculated.

56. In the absence of such measures, the full costs of environmental use will likely continue to be left out of production costs and represent a subsidy from society to those who benefit in the short term from an activity which results in environmental degradation.

57. If the outcome of an activity is totally uncertain in the sense that even the range of possible outcomes is unknown, the guiding rule should be to avoid activities that might have irreversible consequences since their potential costs are incalculable.

"States, in accordance with their capacities, should establish or promote the establishment of systems to monitor the coastal environment, as part of the coastal management process, using physical, chemical, biological, economic and social parameters." (Article 10.2.4)

58. Given the risks and uncertainties involved in management decisions, States will recognize the need to establish monitoring systems for the coastal environment. The goal should be to identify environmental degradation from all sources as early as possible; the policy objective should be prevention, rather than clean-up.

59. Monitoring is necessary to identify the impact of different activities. The fisheries authorities should be involved in monitoring aspects of interest to the fisheries sector, such as habitat and water quality. Such monitoring requires, first the identification of appropriate indicators, second, the establishment of adequate institutional capacity to carry through the monitoring process and third, the analytical capacity to interpret the trends, e.g., differentiating between environmentally-driven and anthropogenic changes.

60. It may not be necessary for the fisheries authorities to undertake the actual monitoring process, although they will be in a stronger position if they do carry out these tasks. Whatever institutional arrangements are chosen, however, States must have the capacity to monitor the coastal environment and fisheries authorities must have access to the information in such a form as to enable them to identify impacts on the fisheries sector as well as from the fisheries/aquaculture sector.

61. Some of the parameters for monitoring which are of special interest to fisheries authorities are referred to in Box 5.

62. For there to be effective monitoring, it is essential that there exists the appropriate institutional capacity. Such capacity might relate to the legal framework for monitoring activities,

and, in particular, fisheries. It may also require measures to be implemented to create and expand at the national level (government, private sector, university), the capacity to develop and use the necessary tools, e.g., environmental impact assessment, cross-sectoral policy analysis, environmental economics techniques, landscape/seascape analysis, environmental capacity assessment, geographical information systems (GIS), etc. Their development requires supporting research and interaction between researchers within and between countries, e.g., at a sub-regional or regional level.

Box 5: Parameters relating to the integration of fisheries into coastal management planning

There is a need to identify those indicators that must be monitored. The range will depend on particular circumstances (the nature of the problem, the budget available) but might include:

physical parameters: e.g., mapping of land-use, area of reclamation and drainage, changes in beaches, virgin land/developed land ratios;

biological and chemical parameters: e.g., water transparency and seabed integrity, extent of seaweed and seagrass beds, biodiversity indices, persistent organic pollutants (POPS) of aquatic production, red tide occurrences, degree of habitat protection;

economic and social parameters: e.g., population density, employment and unemployment, income levels, regional GDP, barriers to entry and exit of main occupations, resource allocation systems, occurrence of social conflict, levels of subsidy in different sectors.

States should promote multidisciplinary research in support of coastal area management, in particular, on its environmental, biological, economic, social, legal and institutional aspects." (Article 10.2.5).

63. Research into the interaction between the environmental and economic systems should be encouraged because of the risks and uncertainties in coastal management.

64. There will be a need to prioritize research needs. In this regard, the fisheries authority should direct its attention to cross-sectoral issues and to economic and socio-economic issues relating to the fisheries sector, in addition to traditional sectoral research concerns which typically have focused on fish stock assessment and biology. Some possible topics are noted in Box 6.

65. The fisheries authorities do not have to ensure that all such research is carried out by its scientists. They might, however, be required to promote easy communication between the fisheries policy makers and scientists to ensure that research institutions address the key issues in the proper integration of fisheries in coastal management planning. In setting research priorities, fisheries authorities need to establish that the priorities match the available funding (making the

case for increased funding when appropriate), and ensure also that funding is directed to the identified priorities. Also, while the fisheries authorities may not be directly responsible for all relevant research, they should make provision that their scientists are aware of such research.

Box 6: Possible research topics for fisheries authorities relevant to the integration of fisheries into coastal area management

Ecological functions: these need to be understood to assess the impact of proposed projects on different users of the coastal area, including fishers; and will include, e.g., studies of overall carrying capacity, impact reversibility, etc.;

resource dynamics: this includes research to distinguish between the natural variability of resources and human impact, and to predict long-term trends resulting from management action and/or climate change;

applied research: e.g., to study sectoral dynamics, to develop cheap and simple ecological monitoring schemes based on appropriate environmental hazard assessment and prediction methods;

socio-economics: to identify the factors underlying the economic activities in the coastal area and impinging upon it;

economics: application of valuation techniques, design and impact of economic incentive systems;

institutional issues: e.g., the legal and property rights framework needed to allow market pricing; organizational arrangements for local level management by communities and for developing co-management over larger areas.

66. It is desirable also that the scientists engaged on research be encouraged to collaborate with those in other institutions, both nationally and internationally.

3. Regional Cooperation (Article 10.3)

"States with neighbouring coastal areas should cooperate with one another to facilitate the sustainable use of coastal resources and the conservation of the environment." (Article 10.3.1).

"In the case of activities that may have an adverse transboundary environmental effect on coastal areas, States should:

a) provide timely information and, if possible, prior notification to potentially affected States;

b) consult with those States as early as possible." (Article 10.3.2)

"States should cooperate at the subregional and regional level in order to improve coastal area management. "(Article 10.3.3)

67. Some fisheries stocks are shared, or transitory, or spend part of their life cycle in more than one jurisdiction. In such cases, developments in one State's coastal area might well have an impact on the fish stocks of a neighbouring State.

68. Environmental impacts, e.g., caused by pollution, coastal erosion, may be transmitted from one State to another by oceanic currents. Consultations with the State or States likely to be affected will assist in the most appropriate valuation of the proposed environmental changes.

69. Many coastal resources, including fisheries, have a strong regional character. Where appropriate, States should cooperate at a sub-regional or regional level in research programmes, and in the elaboration of mechanisms and protocols for the exchange of knowledge, experience and technical assistance in support of responsible development and management of coastal resources.

70. Another area for cooperation is the exchange of information. Where appropriate, States should provide in an accurate and timely manner, whatever relevant information they may possess. Such information relates to the fisheries themselves (biological characteristics of the resources, production by species, economic information) and to the impact on fish stocks of coastal developments, e.g., habitat and pollution effects.

4. Implementation (Article 10.4)

"States should establish mechanisms for cooperation and coordination among agencies involved in development, planning and management of the coastal area." (Article 10.4.1)

71. Conventional sector planning generally takes little account either of the resource externalities generated by the sector and passed on to another sector or those originating in another sector and impacting upon it. Improved planning will enable line ministries to identify and assess cross-sectoral impacts and the effects of management intervention. Such policy analysis is an essential basis for an effective presentation of the concerns of the fishery sector, first when area management strategies are being formulated and, second, during plan implementation, for the satisfactory negotiation with other line ministries and institutions involved in the negotiation process of trade-offs between development proposals.

72. Appropriate institutional arrangements are required to provide for cross-sectoral area management strategies to be formulated and to provide a forum for the resolution of conflicting sectoral-based actual and proposed actions.

"States should ensure that the authority or authorities representing the fisheries sector in the coastal management process have the appropriate technical capacities and financial resources." (Article 10.4.2)

73. In adapting the functions, structure and capacity of fisheries authorities to ensure the sound integration of fisheries into coastal management planning, care has to be taken that the

authorities have the trained generalists and specialists required for comprehensive planning required and to staff properly any core group which might be established to coordinate inter-sectoral programmes and policies.

74. While this concern with institutional capacities is general across the sectors in many countries, it is of particular relevance to fisheries. It is not unusual for fisheries authorities to be lacking skills and experience in policy and institutional analysis and in all aspects of sectoral planning.

75. For fisheries authorities to ensure that the activities and interests of the sector are incorporated into coastal management planning in a way which will maximise the contribution of the sector to economic and social welfare, it is important that they develop strengths in four main areas. These are as follows:

- skills and experience in the collection and analysis of bio-physical, and social and economic information, and its use in policy analysis;

- the establishment of institutional arrangements at local, national, sub-regional, and regional levels to deal with open access issues and cross-sectoral impacts;

- skills and experience in sectoral planning; and

- enforcement capacity.

76. In addition, while in many fisheries authorities it will not be necessary to employ legal staff, staff of these authorities should be sufficiently aware of the sector and its linkages to take an active role in reviews of environmental legislation and the drafting of new law.

ANNEX I

GLOSSARY

Contingency valuation	A technique for establishing a monetary value for a non-traded environmental "good" or service, e.g., a scenic attraction, by asking respondents to the sum they would be prepared to pay. While successes have been claimed for the method, recent re-assessments suggest it should be used with caution and reinforced with empirical research.
Deposit refund systems	A system where a surcharge is levied on the price of products leading to resource depletion or pollution which is then refunded if the product (or its residuals) are re-cycled.
Hedonic pricing	A valuation technique to determine the value of non-traded environmental 'good' which uses statistical analyses to isolate the environmental values which contribute to differences in product prices, typically price differences in real estate prices. The technique has limited application in dealing with resource valuations in, say, the fisheries sector but is well suited to other aspects of the valuation of coastal resources.
Non-compliance fees	"Additional" prices to be paid for not complying with environmental requirements to meet the social costs arising from environmental damages.
Performance bonds	Similar to a deposit refund system where a bond is placed equal to the estimated social costs of possible environmental damage as a surety for complying with environmental requirements and is forfeit if these requirements are not met.
Tradable permits	A system where rights to discharge pollution or exploit resources can be exchanged through either a free or a controlled "permit" market. Examples include Individual Transferable Quotas in fisheries, tradable depletion rights to mineral concessions and marketable discharge permits for water-borne effluents.