Using questionnaires based on the Code of Conduct for Responsible Fisheries as diagnostic tools in support of fisheries management

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Using questionnaires based on the Code of Conduct for Responsible Fisheries as diagnostic tools in support of fisheries management

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FOREWORD

This report is based on a preliminary manuscript prepared by Mr John F. Caddy, FAO Consultant, which was presented and discussed at a Fisheries and Aquaculture Department seminar held at FAO on 14 February 2007. The manuscript was subsequently edited and revised by Mr J. Eric Reynolds and Ms Gunilla Tegelskär Greig (FishCode Programme, FAO Fisheries and Aquaculture Department). Dr Miguel Angel Cisneros and Dr Alejandro Rodríguez of the World Wildlife Fund Mexico Gulf of California Program, and Drs John Kaneko, Paul Bartram and George Krasnick (National Oceanic and Atmospheric Administration Hawaii Seafood Project) of PacMar Inc., Honolulu, are gratefully acknowledged for their valuable input and cooperation in the production of this report. Thanks are also due to a number of FAO colleagues who reviewed the preliminary manuscript and offered constructive criticisms and suggestions both during and after the February 2007 seminar, and to Ms Françoise Schatto (FAO Fisheries and Aquaculture Department) and Mr Luca Limongelli (FishCode Programme) for their assistance with print preparation.

The *FishCode Review* series publishes results of studies, missions, consultations, workshops, meetings and other project activities undertaken through the Programme, in furtherance of the objective of facilitating implementation of the 1995 FAO Code of Conduct for Responsible Fisheries and related international fisheries instruments and plans of action. Individual issues in the series are distributed to appropriate governments, regional bodies, meeting participants and Programme partners. For further information on Programme background, publications and activities, please consult the Web site at **http://www.fao.org/fi/fishcode.htm**.

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ABSTRACT

Although the 1995 FAO *Code of Conduct for Responsible Fisheries* (the Code) is not a legally-binding instrument, it represents a consensus between countries as to the features that should characterize systems designed to ensure sustainable use of fishery resources. This report provides a series of questionnaires corresponding as closely as possible to clauses from Articles 7, 8, 9, 10, 11 and 12 of the Code, which can form the basis for a practical method of evaluating compliance of national or local fisheries with its provisions.

The general questionnaire approach parallels the procedures used by the International Organization for Standardization (ISO) and provides a way of converting statements of principle in a global instrument including a legal framework, into a semi-quantitative form that can be more easily used in a multidisciplinary fisheries evaluation of management performance. Emphasis is placed on displaying the results of questionnaires in an easily understandable form and how these may be incorporated into decision-making.

Approaches that could be used in operationalizing the Code are discussed, using examples where the Code has been applied in questionnaire form for evaluating fisheries objectives described by its different Articles. Other assessment approaches used for related purposes are included for reference. For example, protocols are suggested for evaluating performance in relation to ecosystem management, fisheries co-management and stock recovery strategies, based on the FAO Technical Guidelines for the Code, workshop experience and the fisheries literature.

Different formats and procedures are provided, and some of the problems encountered are described. The use of questionnaires to promote adherence to the Code's provisions are discussed using several practical applications. The focus is mainly on applications of the Code at the grassroots level by local fisheries management authorities operating within national fisheries jurisdictions.

Attached to the inside back cover is a copy of a CD-ROM containing excerpt questionnaires for ease of use.

Keywords: Code of Conduct for Responsible Fisheries, fisheries management, compliance, monitoring, assessment

CONTENTS

Abbreviations and acronyms

CCRF	FAO Code of Conduct for Responsible Fisheries
COFI	FAO Committee on Fisheries
DPSIR	Driver-Pressure-State-Impact-Response(Approach)
EBM	ecosystem-based management
EMS	Environmental Management System
ESD	Ecologically sustainable development
FADS	fish aggregation devices
FMP	Fishery Management Plan
HLA	Hawaii Longline Association
ICAM	Integrated Coastal Area Management
ICRI	International Coral Reef Initiative
IMO	International Maritime Organization
IPOA	International Plan of Action
ISO	International Organization for Standardization
IUU fishing	illegal, unreported and unregulated fishing
LRP	Limit Reference Point
MCS	monitoring, control and surveillance
MSY	maximum sustainable yield
NGO	non-governmental organization
NOAA	National Oceanographic and Atmospheric Administration
PIFSC	Pacific Islands Fisheries Science Center (NOAA)
PIRO	Pacific Islands Regional Office (NOAA)
PSIR	Pressure, State, Impact, Response (Approach)
SAF	self-assessment form
Strategy STF	FAO Strategy for Improving Information on Status and Trends of Capture Fisheries
TAC	total allowable catch
TL	Traffic Light (Approach)
TRP	Target Reference Point
WWF	World Wildlife Fund for Nature
USCG	United States Coast Guard

1. INTRODUCTION

A problem commonly faced in conservation biology is how to reconcile an agreed directive with the scientific measurement and evaluation procedures required for monitoring adherence to its provisions, and then deciding on practical priorities for improving implementation. Often, procedures for evaluating the application of many instruments are not fully elaborated at the time of development. Instead, they will have to be developed through a period of practical application by trial and error, as has been the case for the *Code of Conduct for Responsible Fisheries* (CCRF) in the decade since its adoption. Judging compliance is critical when appropriate responses to non-adherence need to be implemented. In many cases, application of instrument provisions may remain partially in abeyance due to the difficulty of converting statements of principle into quantifiable estimates of adherence. It is suggested that the procedures described in this paper, with minor modification, could be adapted to a wider range of principles or instruments, such as the 1995 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 (UN Fish Stocks Agreement).

1.1 The Code of Conduct: brief background

The 1995 FAO *Code of Conduct for Responsible Fisheries* (FAO, 1995) was the result of a series of intergovernmental meetings that sought to build international consensus on the basic principles required for responsible fisheries. The Code, developed at an intergovernmental level and designed to be consistent with binding international instruments, in particular the 1982 UN Law of the Sea Convention, inevitably focuses at the State level and on those fisheries where State responsibility cannot be easily delegated to local levels of national decision-making on fisheries. Hence, the underlying focus of the intergovernmental consultations held at FAO headquarters, Rome, in the mid-1990s, which led to the final text of the Code, was on issues related to national responsibilities for resource management. There was not a specific focus on how each country might delegate management responsibilities to subsidiary bodies within its national waters, and apart from some general issues touched upon in Article 4 (Implementation, Monitoring and Updating), suggestions for rendering the Code operational at the local fisheries level were not extensively developed, but left to the discretion of member countries of FAO.

The Code's focus on central government's role in the fisheries sector is also explained by the fact that, contemporaneously, the United Nations was developing the "1995 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" (United Nations, 1995), also referred to as the "1995 UN Fish Stocks Agreement". This dealt mainly with issues relating to international fisheries for straddling or highly migratory resources – issues that fall largely within States' responsibility, with States in some cases acting through fisheries commissions or other international arrangements. A degree of cross-checking of the two international instruments during their development led to provisions being similarly phrased in the Code for national waters.

Nevertheless, the Code and its related instruments constitute framework documents and provide a rich source of suggestions on how to manage fisheries at all levels. Thus although the phrase "States should" preceded a significant proportion of individual statements within the Code, some delegation of rights and responsibilities has been incorporated into national legislation and arrangements in many countries, stretching down from subnational bodies, to the local community, industry, cooperatives, or even the level of the individual fisher or citizen in some cases.

FAO has responsibilities globally to facilitate implementation of the Code, to provide technical support for national and regional initiatives towards this end, and to monitor CCRF application and implementation. FAO's efforts to facilitate responsible fisheries have also resulted in the development of Technical Guidelines to implement the Code (see Box 1), the adoption of the four International Plans of Action (IPOAs)[1] and the Strategy for Improving Information on Status and Trends of Capture Fisheries (Strategy STF).[2]

Box 1. FAO Technical Guidelines for Responsible Fisheries

The FAO Fisheries and Aquaculture Department has published the following Technical Guidelines in support of the implementation of the Code:

No.1 Fishing operations
No.1, Suppl.1 Vessel monitoring systems
No.2 Precautionary approach to capture fisheries and species introductions
No.3 Integration of fisheries into coastal area management
No.4 Fisheries management
No.4, Suppl.1 Conservation and management of sharks
No.4, Suppl.2 Ecosystem approach to fisheries
No.5 Aquaculture development
No.5, Suppl.1 Good aquaculture feed manufacturing practice
No. 5, Suppl.2 Health management for responsible movement of live aquatic animals.
No.6 Inland fisheries
No.7 Responsible fish utilization
No.8 Indicators for sustainable development of marine capture fisheries
No. 9 Implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing.
No. 10 Increasing the contribution of small-scale fisheries to poverty alleviation and food security.

(Other technical guidelines are under preparation.)

1.2 FAO's biennial questionnaire for member countries

As the United Nations Organization responsible for fisheries, FAO monitors implementation of international instruments developed in the course of its supporting role in fisheries management at the world level. A report on progress towards implementation of the Code of Conduct and related instruments is submitted to the FAO Committee on Fisheries (COFI) every two years. One useful tool for the preparation of this status report is the questionnaire sent to member countries biennially, which collects basic information on the status of implementation of the Code, the four IPOAs, and the Strategy STF.

The information provided to FAO on the status of national adherence to the Code constitutes valuable feedback to the Organization in judging whether its objectives are being met, and provides a metric to member countries in judging their general progress towards internationally-agreed initiatives. It also helps fisheries administrations to address specific gaps in national implementation. A copy of the official FAO questionnaire on Code implementation is provided in Supplement A at the end of this report.[3] An example extract

[1] The IPOAs relate to: reducing incidental catch of seabirds in longline fisheries; the conservation and management of sharks; the management of fishing capacity; and the prevention, deterrence and elimination of illegal, unreported and unregulated (IUU) fishing.

[2] The Strategy STF was adopted by the twenty-fifth session of the FAO Committee on Fisheries (COFI) and endorsed by the United Nations General Assembly (UNGA) in 2003.

[3] Also included in the CD-ROM attached to the inside back cover of this review.

from an anonymous member country's response to the official questionnaire is shown as Supplement B.[4]

1.3 Adapting the Code's provisions to national fisheries

While voluntary in nature, the Code was developed through intensive negotiation between countries, and consists of a series of statements of principle agreed to by the countries that eventually adopted it. It can be expected that specific interpretations of these principles to suit specific situations in a given national fishery will be made, and will be subject to a process of consensus or confirmation at the national level similar to that witnessed for the Code at the international level. Indeed, this has already happened in some countries, often with inputs from the fishing industry, local and national entities and agencies responsible for the sector, as well as from the public at large and from non-governmental organizations (NGOs). One example of such "customised" applications of CCRF principles is shown in Supplement C of this report, which provides an excerpt from a set of guidelines for implementing the *Canadian Code of Conduct for Responsible Fishing Operations*[5] to the commercial fisheries for mollusks in British Columbia.

These are very positive developments, and the present work seeks to encourage the process by providing example Code application assessment tools in questionnaire form, as presented in Appendixes 1 and 2,[6] that can be adapted to local situations. ***The intention is not to publish definitive Code assessment tools, but to provide material for questionnaires that may be useful for fisheries authorities attempting to evaluate the performance of their management regime*.**

As this report was motivated by several recent applications of the questionnaire approach to the Code in domestic fisheries (inland, coastal and national shelf resources), it focuses principally on those clauses in Articles of the Code that refer to fisheries within State jurisdiction, where the Code is the principal guide to domestic fisheries regulation. Since there is considerable overlap between the Code on the one hand and the UN Fish Stocks Agreement and the FAO Compliance Agreement[7] on the other, questions *specifically* relating to High Seas fisheries issues in the Code, the role of international fisheries commissions and straddling and highly migratory resources, are not included in the questionnaires[8]. The relevant issues are however found in questionnaires for Articles 7, 8 and 11 (see Appendixes 1A, 1B and 1E), and a similar questionnaire or questionnaires to measure compliance of offshore fisheries with the UN Fish Stocks Agreement and the FAO Compliance Agreement could easily be developed. The focus of this report therefore is mainly on those provisions of the Code that are relevant to coastal and national shelf as well as inland water resources.

Specific provisions relevant at the level of regional and local governments, communities, enterprises and fishers are rarely mentioned specifically in the text of the Code. It may be

[4] FAO's official questionnaire clearly implies that a way of evaluating compliance of a State's fishery regulations with the Code is needed. Yet in a document provided to the twenty-third Session of COFI in 1999 (COFI/1999/INF:6), it was reported that progress thus far in reporting had been quite slow, as was predicted by Doulman (1998). However, a report to the twenty-seventh session of COFI in 2007 (COFI/2007/2) noted an increase in the submission of questionnaires, possibly reflecting the concern that was expressed at the Twenty-sixth Session in 2005 about the low level of reporting. It is also clear that the official FAO questionnaire needs to be adapted to work at the operational level, if only because in some cases it may be completed by officials with a interest in achieving a high score (Pitcher 1999).

[5] See: www.fisheriescouncil.ca/pdf/FCCFishingOperations6.pdf

[6] Also included in the CD-ROM attached to the inside back cover of this review.

[7] The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (FAO Compliance Agreement).

[8] International fisheries issues are dealt with in more detail in the 1995 UN Fish Stocks Agreement, where straddling and highly migratory resources are concerned, and in the FAO Compliance Agreement, which, according to FAO Conference Resolution 15/93, paragraph 3, forms an integral part of the Code of Conduct.

asked then, who are the intended recipients of a questionnaire based on clauses of the Code? If they are to be applied, the principles of the Code need to be devolved to the level of the coastal community, fishing industry or even the individual fisher. However, taking into account local conditions, a parallel process of adjusting local fisheries management procedures to its provisions is then to be expected. The success of such a process will depend on the existence or otherwise of legislation that encourages development of management structures at the local level.

In some States where fisheries are considered as an activity lying mainly within the private sector, the role of the government may be limited, except as a guarantor of international treaties. Yet the same principles of correct management may be considered to apply in all cases, even if the questions are not only relevant to national departments concerned with fisheries. In this view, the Code is regarded as a resource of relevance at all levels of society.

1.3.1 Operationalizing and monitoring adherence to the Code

A related application issue relates to difficulties in operationalizing the Code. Despite the provisions of Article 4 (Implementation, Monitoring and Updating), systems of monitoring and quantifying adherence to the Code at the working level need to be developed. Evidently there is a good deal of work to be done in all areas of application to facilitate progress towards an effective and participatory approach to responsible inshore fisheries.

An approach using questionnaires has the advantage that although these may be based on a set of internationally-agreed principles, other items of specific concern to a particular sector can be added, since the underlying principles are only implied rather than stated in a questionnaire format. As such, responses to questionnaires become useful descriptions of the operational status of the fishery as compared with the approved principles embedded in the Code or other instruments.

As will be described in greater detail in Section 3, the use of questionnaires given for Articles 7 to 12 was adopted for a workshop organized in 2005 by the World Wildlife Fund for Nature (WWF), Mexico, to test adherence of the Gulf of California fisheries to provisions of the Code. Particular care was taken there to avoid potential conflict with issues falling exclusively under federal jurisdiction, which clearly is the case for transboundary and high seas resources. Articles and questions relating specifically to the international competence of the coastal State were left in abeyance or modified, where this was appropriate for local management of marine resources within the Gulf of California. The workshop participants also saw the need for clarifying the significance of the Code in light of specific situations prevailing in inshore fisheries that were not dealt with in detail during the negotiations which led up to the Code.

The series of statements within Articles 7 to 12 of the Code were converted with minimal modification into questionnaires for each clause (Appendix 1).[9] The questionnaires may be used together or separately, and even the sub-paragraphs of each Article can be scored separately. In the process of developing the questionnaires it became evident that while modifying the Code during the original approval process, many statements in the Code had incorporated axiomatic statements derived from earlier legal documents. Some of these underlying principles had to be disentangled in order to arrive at the final questionnaires.

It should be emphasised that the Code is a forward-looking instrument, and no fishery on the world's oceans or inland waters is likely to correspond exactly to its provisions. The initial scoring to the questionnaire is thus unlikely to be high, especially if there has not been a specific attempt to approach the "idealized" situation envisaged by the Code. A questionnaire may be repeated at intervals of several years while specific deficiencies are tackled; this system of questionnaires should then provide a useful means of tracking improvements in implementation over time.

[9] Also included in the CD-ROM attached to the inside back cover of this review.

Growing practical experience with fisheries management makes it clear that to be effectively applied, management provisions must be addressed to national governments operating in cooperation with local or subnational bodies (see, e.g**.** Shotton, 2000). In some national jurisdictions rights have been ceded to the fishers themselves, while NGO's, the public at large, consumers, and those concerned with marketing fish products, may have developed the means to influence decisions within the fisheries sector in certain countries. All those groupings or entities are usually considered to be covered by the term “interested parties'' and, in accordance with the Code, should be consulted in formulating fisheries management measures. In more common parlance, such groupings are often referred to as the “stakeholders” in a fishery. Popular usage of this term supposes that it includes all those who will be “customers” for fisheries information provided by experts from a broad range of disciplines. In formulating the individual clauses of the Code as questions, therefore, a general audience orientation needs to be kept in mind. Diverse questions may be answered from diverse perspectives in the very diverse world of fisheries!

1.3.2 The Code, Technical Guidelines, and criteria for evaluating coastal fisheries

The *FAO Technical Guidelines for Responsible Fisheries* spell out specific operational issues and practical suggestions that are not discussed in detail within the Code and its related instruments, such as community-based management, user rights, ecosystem conservation, coastal pollution, etc. They are non-binding in nature, of course, like the Code itself (even though, in many countries, provisions of the Code have now been introduced into national legislation). Nonetheless, the Guidelines offer valuable ideas for operationalizing the internationally-agreed principles of the Code, and some of their aspects were taken into account in the example questionnaires presented in the appendixes. It is suggested that when adding to questionnaires items of local or additional interest that are not based directly on the Code, they be kept distinctive by *italicizing* them. It is also suggested that they not be included in evaluations strictly aimed at assessing adherence to the provisions of the Code.

Appendixes 2A and 2B present examples of entire questionnaires[10] – the first related to the application of the ecosystem approach and the second to community-based management – that are not based on direct conversions of CCRF clauses. Though not “anchored” in specific articles of the Code, they nevertheless concern critical responsible fisheries issue areas. Also, while framed in fairly generic terms to provide examples, they may of course be modified in the light of specific situations applying to particular local fisheries.

In administering questionnaires, the approach adopted in Caddy (1996, 2000) to Code Articles dealing with management and research is proposed as a relatively objective way of evaluating adherence to the Code, and to provide a scoring system as an aid in monitoring. This approach also conforms with practice in other areas of endeavour such as environmental impact assessment, as specified in the International Organization for Standardization (ISO) series.

Some duplication of questions inevitably results from a “dissection” of individual clauses in the Code into their underlying principles, but these have been left in place as indicating issues of particular importance. If a single statement in the Code generates more than one question, obviously there are at least two options. The first is to score each clause with the same weighting (e.g. if three questions are generated by a single statement, their individual weightings would each be 1/3). Alternatively, each multiple question generated could be scored equally without weighting. This second option of course means that each statement in the Code may receive different total scorings depending on the number of questions it generates. But since some of the subsidiary questions a Code statement has been broken down into are of fundamental importance, any weighting of questions would be subjective and difficult to justify. No fixed recommendation is given on this point, and no attempt is made here to weight the different questions by their perceived relative importance. The degree of

[10] Also included in the CD-ROM attached to the inside back cover of this review.

repetition has been left intact, with an assumed equal weighting for each question. Mention is made of other options if some specific application requires it.

Translating the Code into questions involves a degree of subjectivity, more so if the questions are translated into other languages, and scoring the answers will require impartiality and judgement. It must be stressed therefore that although they provide a useful way of visualizing the Code's implications in practical terms, the questionnaires presented in the appendixes do not have the authority of the Code. Some examples of ambiguities in the Code result from the problem of defining terminology. For example, the common phrases; "conservation and management measures", "confidentiality requirements", "complete and reliable statistics", etc., may be interpreted differently by different parties. In adopting the Code, the members of FAO deliberately did not enter into the question of the "best" definition of its component terms for the obvious reason that if they had done so, an overall consensus would have been postponed – perhaps indefinitely. Commonly used meanings of terms are therefore implied in the questionnaires also. This does not preclude specific definitions being incorporated when the questionnaires are used in specific fisheries situations.

1.3.3 Official FAO monitoring and detailed questionnaires for local use

Evidently there is a potential overlap between the official FAO biennial questionnaires and the detailed approach to national fisheries evaluation described in this report. Although the present approach might be seen as an outgrowth of the official questionnaire, some distinctions can be made:

(a) The intention for the detailed questionnaires is that they be applied to specific fisheries within national jurisdiction, as opposed to providing a general evaluation of national fisheries. Since all clauses of the Articles in question are converted into questions, a more detailed tracking of compliance is possible at the level of individual national or sub-regional fisheries.

(b) The detailed questionnaires are intended to be completed individually by independent experts, allowing a statistical evaluation of responses to be made at all levels in the national and international fisheries hierarchies.

(c) Especially where completed by the fishing industry, the public or consumers, or by NGO's, a less favourable evaluation may result than when a questionnaire is completed by the government agency responsible for fisheries management.

(d) A method of scoring is suggested that allows the questionnaire results to be used as a form of objective assessment in support of fisheries management.

2. A METHODOLOGY FOR USING THE CODE IN PRACTICAL FISHERY MANAGEMENT

2.1 Recent developments in fisheries science

A brief summary of recent developments in assessment science may set the context for the use of the questionnaire approach in advising fisheries management, and it is useful to begin with the concepts of indicators and reference points. Simply put, annual series of indicator values can measure trends in important variables affecting a fishery or generated by it, and reference points are values of these indicators that are believed to correspond either to optimal status for exploitation (Target Reference Points – TRPs), or the onset of potentially dangerous conditions (Limit Reference Points – LRPs; see Figure 1). Prior to the UN Fish Stocks Agreement the only reference points commonly used for fisheries management were TRPs such as the maximum sustainable yield (MSY) and the level of fishing effort corresponding to it (f_{MSY}). A number of similar reference points also existed, expressed in terms of the fishing mortality rate that, on average, was believed to correspond to some theoretical maximum for fisheries yield (e.g. F_{MAX}, $F_{0.1}$; see Caddy and Mahon, 1995).

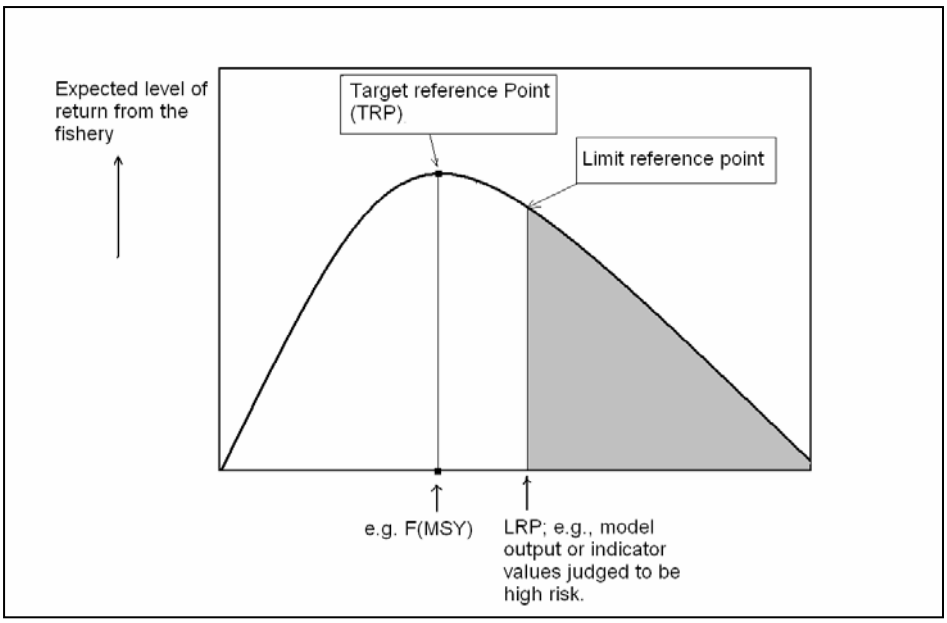

Figure 1. *Conceptualization of the difference between modifying fishing effort to realize a Target Reference Point (TRP), and seeking to avoid an area (shaded in grey) beyond a Limit Reference Point (LRP) which can be defined empirically from the value of an indicator.*

By the time the UN Fish Stocks Agreement was being negotiated, it had already become clear to managers that setting targets alone was not necessarily precautionary, unless the targets were set significantly below f_{MSY} effort levels. One reason for this change in perspective was the realization that overshoots of the target fishing effort were inevitable, given often poor or unreliable resource information, as well as environmental variability. Such overshoots were inevitable if a ”target” could not be specified exactly, and overshoots proved not to be easily reversible, given the situation of fleet overcapacity common to many industrial fisheries nowadays (e.g. Gréboval, 1999; Gréboval and Munro, 1999). Effort overshoots in quota management systems are particularly common, and lead to conditions of stock depletion and the need for decisive actions to restore resources to health. Planning and implementation of such recovery actions requires consideration of a wide array of key questions, such as those suggested in Supplement D of this report.

Given the high degree of uncertainty inherent in fisheries data, and the usual excessive reliance by assessment science on only a few indicator series (annual catch, effort and fishing mortality rate), a more precautionary approach is needed (Garcia, 1996). One approach agreed to at the negotiations leading to the UN Fish Stocks Agreement was to formulate LRPs, or indicator values that mark the onset of dangerous conditions in the fishery, rather than simply targeting optimal conditions (Caddy and Mahon, 1995). When LRPs are approached, measures should be established to reduce fishing effort significantly until the resource has recovered at least to the level that could yield MSY once more.

In summary then, the use of mathematical models to estimate and potentially target optimal exploitation conditions (TRPs) has now begun to be supplemented by precautionary or “fail-safe” procedures using less easily quantifiable information, which are intended to prevent the fishery from entering dangerous conditions that may not be easily reversible. All of this is a preamble to making the point that a wider range of data and indicators is now generally required as a result of recent multidisciplinary initiatives (e.g. Regier, 1992; Berkes, 2005; Caddy, 2006). These initiatives have placed emphasis, *inter alia*, on socio-economic and environmental factors, as well as the conservation of marine ecosystems and habitats (cf. Kendall, 1999; Pajak, 2000; Laane and Peters, 1993). New management initiatives being introduced in some fisheries also require that wastage due to by-catch and discarding, and the incidental impacts of fishing on protected species, be minimized. A mathematical model

that will *a priori* dictate what level of catch and effort is precautionary while taking all of these factors into account is not readily available. Our improved understanding of the need to set limits seems inevitably to call for a broader, multidisciplinary approach to management advice, and one that (especially, but not exclusively for developing countries) makes greater use of qualitative or semi-quantitative data as a guide to management action (e.g. Garcia, 2000). What this section is pointing to is the possibility of using output from a questionnaire to guide decision-making in fisheries management, at least where long-term policies and management planning are concerned.

2.2 Measuring compliance to environmental and other standards: examples relevant to fisheries monitoring

2.2.1 The ISO-Standards approach

In the industrial world, quantitative data gathering is expensive, and staff- and time-intensive. The ISO[11] Standards approach (ISO 2006) has been widely used for quantitative evaluation of the performance of industrial sectors using standardised questionnaires documenting qualitative or semi-quantitative responses.

The use of multiple questions on the state of application of established optimal procedures, scored for compliance in a particular situation, has proved widely effective. A quick example could be where the objective is the efficient and pollution-free running of gas stations compatible with minimizing public health risks and reducing the risk of pollution of the countryside by oil residues, etc. Qualitative responses to questions by experts and those most concerned is an accepted procedure. A scoring by qualified personnel reveals the overall efficiency of such an approach, as well as deficiencies that need to be corrected. A somewhat similar function can be envisaged for questionnaires based on the Code.

The ISO 14000 criteria, for example (ISO, 2006), form a voluntary standard used in the areas of environmental management, auditing, performance evaluation, labelling, and life-cycle analysis of industrial processes. It is worth comparing this approach with the information needs of fisheries managers, to see how it can be adapted to the multi-disciplinary fisheries context. The goal of ISO 14000 is to promote better corporate environmental stewardship through the creation of a series of internationally accepted standards for companies to use in managing the environmental aspects of their operations. This goal is accomplished through the development of an environmental management system (EMS), which may be subject to certification by third-party registrars or by the individual companies themselves through a self-certification process.

Although ISO 14000 specifies the EMS requirements, and provides a working framework, it does not provide a fully designed EMS. This task, including a programme that assigns responsibilities and sets a time frame for achieving objectives and targets, is left to each company or entity applying the standards. Specifics of a company's EMS will depend in part, however, on whether or not it is pursuing third-party certification by a registrar. A company that chooses to pursue third-party certification may have less flexibility in establishing its EMS than a company that opts for self-certification. The starting point for the development of an ISO 14000 EMS is the adoption of a corporate environmental policy statement that should be appropriate to the nature and scale of the company's activities and include a commitment to pollution prevention and regulatory compliance. It should be issued by management and be liberally communicated to all employees. Under ISO 14000, this policy should also be made available to the public. All of these considerations have direct analogies in the fisheries management context to the application of the Code of Conduct for Responsible Fisheries.[12]

[11] The International Organization for Standardization (ISO) is a worldwide federation founded to promote the development of international manufacturing, trade, and communication standards. For more information see www.iso.org/iso/en/ISOOnline.frontpage.

[12] It should be noted that the ISO has recently established a new technical committee for developing standards for

At the heart of an ISO 14000 EMS is the requirement to conduct regular audits of a company's operations. These audits must be comprehensive and carefully tailored to ensure that any non-compliant activities are identified and addressed. A company must also make a commitment under the EMS to promptly correct any deficiencies identified during these audits. The focus is on whether the proper "systems" are in place to ensure that a company maintains its compliance with its regulatory obligations. One of the primary motivations for becoming “ISO 14000 certified” is the perception that compliance with this standard will eventually become a requirement for doing business in the global marketplace. In European markets, for instance, the incentive for ISO 14000 certification is linked to the high consumer demand for environmentally-conscious businesses, and analogies can be made here with the eco-certification procedures now becoming more widely adopted in fisheries. In fact, a recent study indicates that the third most important reason (after quality and cost) why a product is purchased in the European Union, is that the producing company is considered "green."[13]

2.2.2 Ecologically sustainable development and flag State assessment procedures

Other assessment procedures in addition to ISO 14000 that could be helpful in the development of fisheries monitoring systems include “Ecologically Sustainable Development” (ESD), used for example in Australia. ESD includes risk-assessment methods to prioritise the identified issues to assist in determining the appropriate level of response.

The International Maritime Organization (IMO) self-assessment form (SAF) for flag State performance also seems a relevant example. Adopted by the Assembly in 1999, as resolution A.881(21) – Self-assessment of flag State performance, the resolution urges Member Governments to use the SAF for the purpose of identifying their weaknesses in discharging their responsibilities as flag States under the various IMO conventions and also for the purpose of seeking technical assistance through IMO. Member Governments were also invited to communicate to IMO, on a voluntary basis, a copy of their SAF to enable the Sub-Committee on Flag State Implementation to establish a relevant database.

2.2.3 The ICRI approach

The International Coral Reef Initiative (ICRI) is concerned with raising awareness and commitment vis-à-vis the need to take action to conserve coral reefs, *inter alia* by identifying the strengths and weaknesses of national policies and actions governing the use of coral reefs and their associated resources. A “scorecard” was proposed at ICRI’s 2004 meeting, to be filled out by “...national committee[s] consisting of representatives from relevant government agencies, NGOs, civil society, industry and the private sector” (ICRI, 2004). Countries are called upon to submit scorecards to ICRI as part of their national reporting obligations. The process would provide a baseline against which to measure progress in achieving ICRI objectives over time. Results are to be shared with the general public.

The scorecard was envisaged to consist of an introductory data sheet, followed by a rating table consisting of five parts as defined by the ICRI “Call to Action”, namely:

(a) Coastal management;
(b) Governance and Capacity building;
(c) Education and outreach;
(d) Research and Monitoring; and
(e) Review.

fisheries and aquaculture (ISO/TC 234), whose first plenary session is scheduled for early October 2007, in Bergen.

[13] See: www.driso.co.uk/Resources/Article22.html .

A brief extract of several tables is provided as Supplement E to illustrate formats and approach to scoring used in the scorecards. Those of particular interest in relation to the Code include:

(a) evaluating the status of planning for the fisheries sector, and its incorporation of integrated coastal management measures;
(b) evaluating the performance of fishery management measures;
(c) enforcement, legislation and incentive programmes;
(d) budgetary sufficiency to carry out actions proposed; and
(e) approaches to an overall review and evaluation.

The last two questionnaire components are of special relevance in terms of operationalizing the CCRF, although they are not given detailed treatment within the body of the Code.

2.3 Indicators of sustainability: the AMOEBA approach

Pajak (2000) emphasized that sustainability indicators can help simplify, quantify, and communicate information about natural ecosystems, societies, and decision-making processes, and proposed that the "AMOEBA" approach developed in the Netherlands for environmental assessment (see e.g. Ten Brink *et al.*, 1991; Laane and Peters, 1993) be used to illustrate the state of ecosystems. This method has also been used as a support tool for the management of ecosystems important to fisheries (e.g. Regier, 1992 and Wefering *et al*., 2000). Essentially, fisheries management has to attempt the multidisciplinary task of integrating four interdependent domains: resources, environments, decision-making institutions, and society. Despite considerable progress in mathematical modelling within particular specialities such as stock assessment and economics, the overall integration of these four fields has so far resisted the mathematical approach, and still relies on outputs of information from the various sectors of the fisheries sphere of action. Thus, Pajak (2000) emphasizes that the new priority of ecosystem-based management (EBM) attempts to integrate ecological, economic and social factors "...within a geographical framework defined primarily by ecological boundaries". To attempt this difficult task, indicators are necessary, and various approaches to classifying and displaying these will be briefly summarized in the following sections. A hypothetical example is illustrated in Figure 2.

2.4 Semi-quantitative information

In fisheries management, as for the assessment of the impacts of environmental or ecosystem changes, questions may be asked that require expert judgement because quantitative information is not available. It is important in such situations that some objective evaluation be attempted in a standardized way by those with experience and judgement who are closest to the situation. As in the official FAO questionnaire, responses may be categorized in various ways. Examples include the following.

(a) When estimating by-catch abundance from eyewitness reports, respond with 1, 2 or 3 where, judging from experience in (say) 1970-2002

1 = low abundance,
2 = medium abundance, and
3 = high abundance.

(b) With regard to the successful application or otherwise of a management measure, respond Yes (3), Partially successful (2), No (1), or No information (0).

(c) With regard to research priority items, respond Top priority (3), Medium priority (2), or Low priority (1).

(d) With regard to the impact of a management measure on a resource, respond High (3), Moderate (2), Low (1), or None (0).

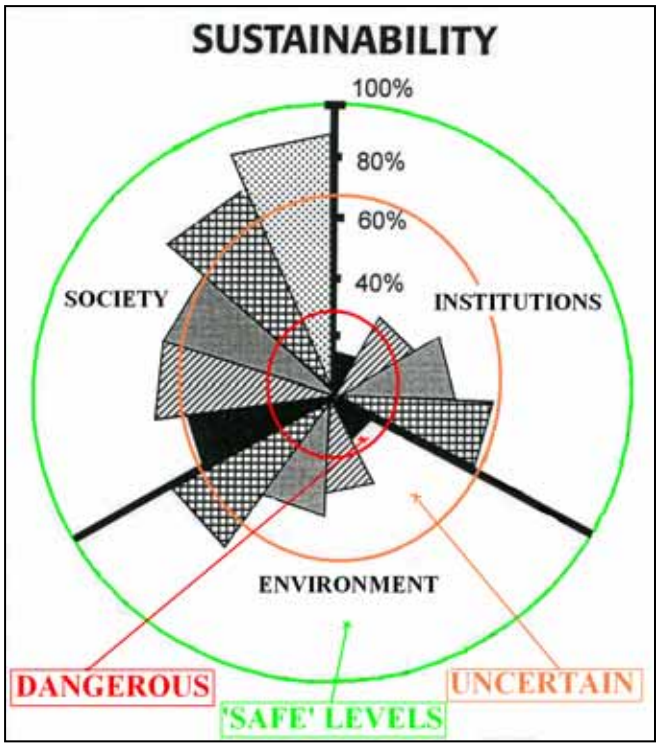

Figure 2. *AMOEBA plot modified from Pajak (2000), summarizing sustainability indicators from 3 sectors: Society, Environment and (decision-making) Institutions. Incorporating the "Traffic Light" convention, three levels of indicators have been set: Those entering the "Green" zone exceed 70% compliance, agree with established criteria, and are "safe". The "uncertain" or "Yellow" zone is arbitrarily set at between 30–69% of maximum indicator values, while "dangerous" conditions prevail within the red circle at 30% or less compliance (these values are arbitrary and may be modified to better fit the local situation and the indicators used).*

(e) Use a simple yes/no response if a question is asked independently of a group of experts or stakeholders; combining individual responses will then provide a percentage yes/no score that can be incorporated into a multiple response evaluation.

All of the above are options for the sample questionnaires shown in the Appendixes. In all cases, the categorization of responses converts a qualitative or yes/no response into a quantitative response that can be incorporated into an evaluation of the state of compliance with the Code, or even into a decision rule for use by management. If multiple responses can be used to give a confidence interval, or if semi-quantitative data are available, so much the better.

2.5 The traffic light approach

In the "Traffic Light" (TL) Approach, low impacts on the resource or favourable conditions, are represented by green; moderate or uncertain impacts by yellow; and high impact or unfavourable conditions (i.e. showing that the LRP has been infringed), by red (e.g. Figures 3 and 5). Such an approach to integrating a wide variety of indicator values is now being widely used (e.g. Halliday *et al.*, 2001; Caddy, 2006 and Caddy *et al.,* 2005).

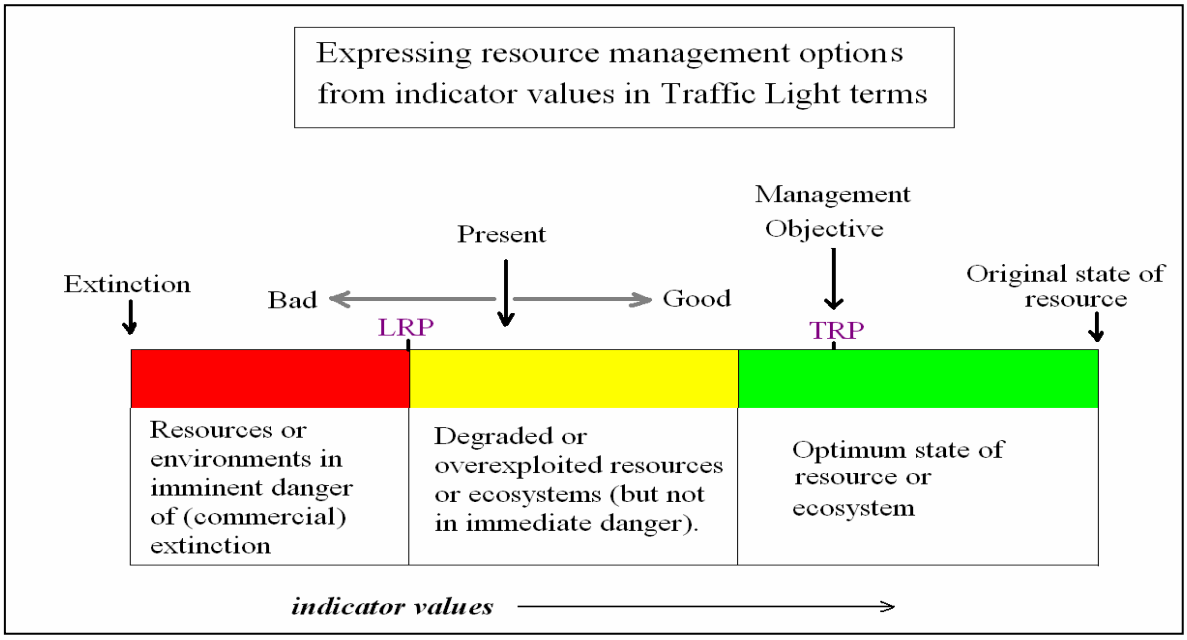

Figure 3. *The use of a traffic light code for illustrating the state of a fishery by colour coding indicator values*

2.6 The fisheries control rule

One management approach that has recently been adopted in a number of fisheries is the use of so-called "fisheries control rules" (e.g. Kirkwood, 1992; Cochrane *et al.*, 1998). Such a rule may use data inputs from models, but may also use indicator values directly. In a simple hypothetical form, indicator values for characteristics such as productivity, biomass, and fishing effort could drive a decision framework. If quota control applies, for example, a monitoring system based on a traffic light approach incorporating indicators for biological production, fishing effort and stock size might be based on the three statements shown in Box 2, for which the logical operators would allow easy incorporation into a computerized procedure.

Following such a rule, the Total Allowable Catch (TAC) for the coming year would be largely determined by changes in three sets of indicators measuring different aspects of the fishery and their respective values. The quota changes relative to last year's allowable catch would thus be dictated by precautionary rules: favourable conditions would allow a modest increase in quota, but unfavourable changes would lead to a larger cut in quotas. Evidently this procedure is not always applied in conventional fisheries management, which, in the absence of capacity control, tends to lead to continual increases in the rate of resource exploitation.

Box 2. A hypothetical quota management rule

(1) IF Fishery production = green, AND Fishing effort = green, AND Stock size = green, THEN: TAC increment can be "small and positive";

BUT:

(2) IF Production = green, AND Fishing effort = yellow, AND Stock size = yellow, THEN TAC increment is "no change";

OR:

(3) IF Production = yellow AND Stock size = red, THEN TAC increment must be "negative".

It probably would not be possible to develop such a quota rule based solely on Code questionnaires, but over the long-term, fishery policy could be driven by a rule based on periodic scorings from questionnaires similar to those given in Appendixes 1 and 2.

One approach to consider in prioritizing activities in the fisheries management framework is that which is, in effect, used informally by many fisheries managers – namely, to take into account both established priorities, and the observed performance of a particular management measure, and use them in combination as a basis for planning future expenditures and staff member allocations on specific activities within their competence. Suppose that:

(a) the priorities (P) of the management authority in terms of Articles or even paragraphs within the Code, are numbered (say) from P = 7 (high priority) to P = 1 (low priority), and

(b) 100-S, where S = Score, is the percent shortfall for a particular Article or paragraph based on the questionnaire responses below 100 percent.

Thus a high value of 100-S is unsatisfactory and needs correction, and vice versa. The product P*(100-S) then combines both the perceived importance, and the deficiency in performance, for that Article or paragraph. The following table presents a hypothetical case in which the top priorities resulting from application of this criterion are given in bold.

Table 1. A hypothetical case combining established priorities and performance of management measures in prioritizing activities in the fisheries management framework

Article/Paragraph	Ranking by perceived importance (P)	Score from questionnaire (S%)	Product: P*(100-S)= shortfall (rank = priority for action)
7.2 Management objectives	7(highest rank)	75%	175(4)
7.3 Management framework and procedures	1(lowest rank)	67%	33 (1)
7.4 Data gathering and management advice	3	46%	162(3)
7.5 Precautionary approach	5	30%	**350(7)**
7.6 Management measures	6	56%	**264(6)**
7.7 Implementation	4	44%	**224(5)**
7.8 Financial provisions	2	52%	96(2)

According to this hypothetical analysis, the top priorities for action in the immediate future should be to pay more attention to precautionary issues, and to tighten management measures and their implementation.[14]

2.7 Monitoring requirements

It is evident that during approval of a fisheries management framework, efforts should be made contemporaneously to address the monitoring requirements. While Article 4 deals with monitoring in general terms, it does not provide an operational or quantifiable procedure for achieving this. This same statement can also be made in relation to certain legally binding instruments, such as the Biodiversity Convention and the 1995 UN Fish Stocks Agreement. The questionnaire approach offers the clear advantage for converting a set of guiding principles into a means of monitoring adherence to the principles in question. If properly designed, this approach is capable of using qualitative or semi-quantitative information to obtain quantifiable results. To do so, however, it will be necessary to consider how the outputs from a fishery can be monitored, and how these can be used to modify the inputs so

[14] This hypothetical example should not, however, be seen as reflecting on the relative importance of the paragraphs of CCRF Article 7.

as to ensure sustainability. Some of the issues concerned are shown in diagrammatic form in Figure 4.

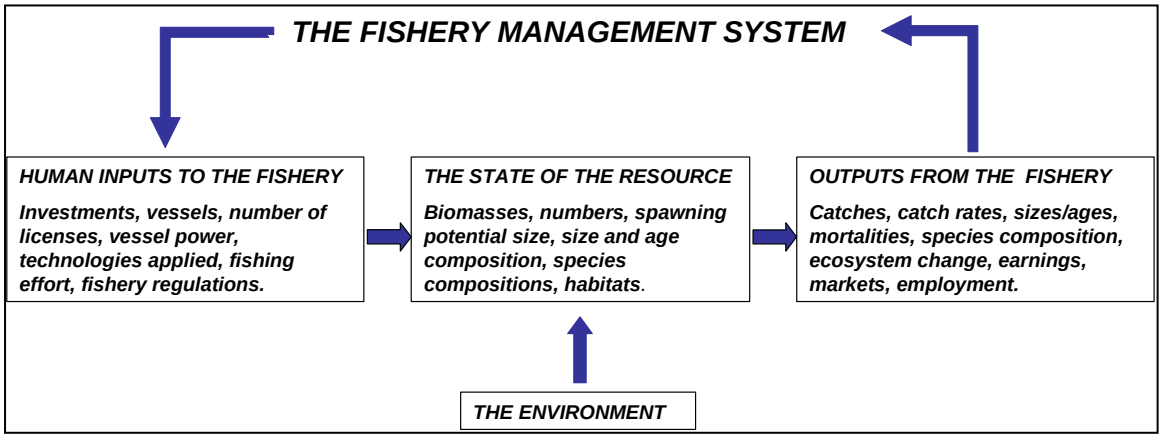

Figure 4. *Schema showing how fisheries management is dependent on an appropriate set of indicators to allow a control of INPUTS to the fishery, and the ability to modify OUPUTS reflecting both human actions and the influence of the environment; in both cases also measured by indicators.*

2.8 Displaying the results of questionnaire outputs

Where the performance of fisheries management is being evaluated using the questionnaire approach, it will be useful to develop methods of displaying the results so that needed corrections to the management regime can be easily visualized. Four approaches can be mentioned: the Pressure, State, Impact, Response (PSIR) approach (e.g. Garcia and Staples, 2000), the Driver-Pressure-State-Impact-Response (DPSIR) approach (Caddy, 2004), the questionnaire approach (this report), and the AMOEBA methodology (Ten Brink, 1991; Regier, 1992; Laane and Peters, 1993).

These are all modes of illustration and may be combined in various ways as illustrated by the hypothetical example shown in Figure 5, which uses the AMOEBA methodology modified to incorporate the traffic light convention. In Figure 5, the length of the grey or black 'spokes' corresponds to the scoring received for different paragraphs of the Code: the maximum score is given where all questions result in a response which takes the "spoke" out to the outer margin of the green zone. In these figures, Articles 7 and 8 effectively have to be considered together, and this is logical where the management of marine fisheries is concerned. Figure 5 has rearranged the 18 paragraphs from these two Articles into two categories, based on whether their provisions are predominantly concerned with INPUTS to the fishery, or with OUTPUTS from fishing and the effects of fishing on the sustainability of resources and environments. Such a classification, if only approximate, is useful, because ideally "feedback" should occur to the management process from indicators monitoring outputs from a fishery, so that they can be used by management to modulate the inputs.

Figure 5 represents two hypothetical situations where the scorings from paragraphs considered as inputs and outputs show two types of "imbalance" in the fisheries informational infrastructure. The upper figure is a fairly common situation where the regulatory framework is well-developed, but methods of monitoring, assessing and correcting outputs from the fishery are still at a rudimentary stage, are neglected, or are held hostage to special interests. the lower figure shows a situation which is perhaps typical of the better-run artisanal fisheries, where the regulatory framework is informal but effective, using social mechanisms within the community that do not show up as formal rules but result in outputs not exceeding resource productivity.

The management process ideally seeks a balance between inputs and outputs. Figure 5 demonstrates how the use of questionnaires can simply and directly estimate the actual

status of this balance. Incorporating a traffic light colour code allows us to consider the interface between red and yellow circles as a type of limit reference point. Crossing the interface between yellow and green areas represents a target for management to aim for, perhaps through repeated questionnaire applications completed (say) at five-year intervals.

The original text of the CCRF consists of a series of approved statements of principle, and in order to adapt a questionnaire to local circumstances, any new items included, or rewordings, must be subject to a process of social agreement or confirmation, as was the Code itself. Such a process of reconfirmation could be achieved through government consultation with the fishing industry, and input from science, and from local and national government agencies responsible for the sector. A series of questions has no jurisdictional authority nor does it imply that any specific action be taken. The original principles are only re-evoked when the questionnaire responses are used to formulate a management plan. As such, a questionnaire is more a description of the operational status of the fishery against a set of approved principles, than a set of principles itself.

Displaying multiple indicators simultaneously has emerged as one of the useful roles of a TL bar chart (e.g. Figure 3 and Caddy *et al.*, 2005), and may even allow some limited degree of forecasting if the population is subject to regular perturbations, and size- or age-structured data are available. More generally, the tendency to follow prejudices in the choice of explanatory hypotheses is to a certain extent curtailed by seeing time series of multidisciplinary data plotted together. Of course, arriving at a situation where extensive time series of evaluation of management efficiency is possible will require more years of data than are available for most resources; but in theory this should be aimed for.

2.9 Expressing the Code as a questionnaire – some methodological issues

As noted, some duplication of questions inevitably results from a literal translation of individual CCRF clauses into questions; but these have been left in the sample forms provided in the Appendixes as indicating the emphasis given to particular clauses in the Code. If a single statement in the Code generates more than one question, each of these subsidiary questions could be scored in the range 0 to 1, without weighting. This of course would mean that individual statements in the Code may receive different total scorings depending on the number of questions they generate. Since some of the subsidiary questions a Code statement is broken down into are of fundamental importance, any weighting of subsidiary questions would be subjective and difficult to justify. However, this issue is left to the discretion of users.

During the approval process that led up to the Code, meetings of national experts subjected early drafts to intensive scrutiny. Individual statements in early drafts of the Code were added to or modified, with the result that in a number of cases, more than one operational directive has been incorporated into an individual clause.

In order to illustrate the approach taken in breaking down the Code statements into questions, an example is drawn from Caddy (1996) for Article 7.1.2, which reads:

> *Within areas under national jurisdiction, States should seek to identify relevant domestic parties having a legitimate interest in the use and management of fishery resources and establish arrangements for consulting them to gain their collaboration in achieving responsible fisheries.*

This was decomposed in the Article 7 (Fisheries Management) questionnaire into two separate items, namely:

(a) Have attempts been made to identify domestic parties having a legitimate interest in the use and management of fisheries resources?

(b) Have arrangements been made to consult these parties and gain their collaboration?

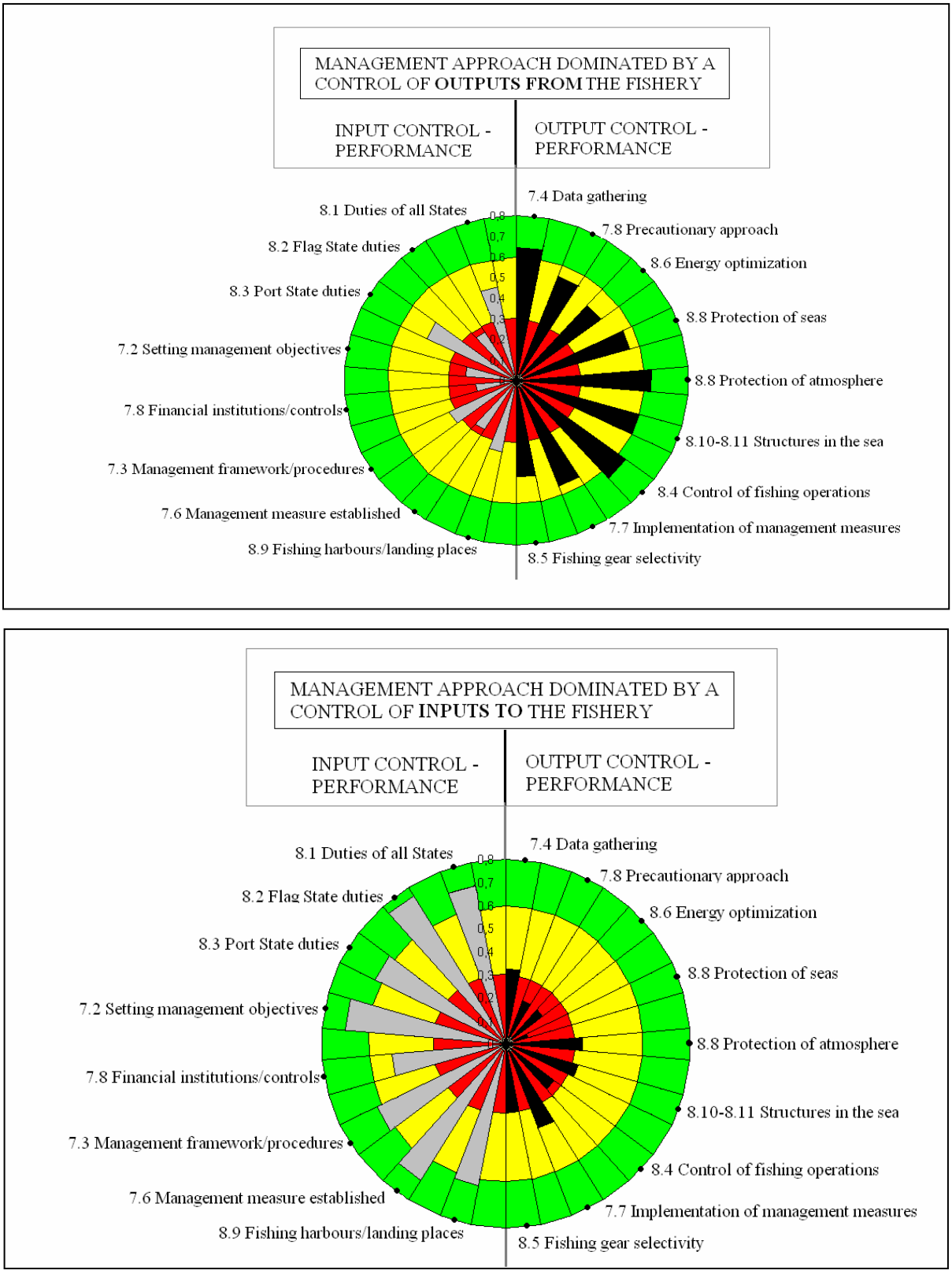

Figure 5. *Two hypothetical management regimes are depicted, with differences exaggerated for purposes of illustration. In the upper figure, the emphasis has been placed by management on improving the measurement of OUTPUTS from the fishery, while in the lower figure, the emphasis has been placed on a control of INPUTS.*

The question of what weight to give the individual questions must be left to the users, and will depend on priorities linked to particular fisheries circumstances (Table 1 above provides a hypothetical case). One approach to weighting at the national level would be to use the Official FAO questionnaire (Supplement A)**,** which asks for a ranking of national objectives for the fisheries sector. One (anonymous) country's ranking of national objectives can be seen in the excerpts from a completed official questionnaire provided as Supplement B.

Another example, given in Figure 6, shows in a diagrammatic way how a particularly complex clause (Article 12.1) needs to be broken down into separate questions before a degree of compliance to its provisions can be established. The process of dissecting the clauses of the Code in this way is revealing of just how condensed the text of the Code may be. Individual clauses contain a number of ideas that, when cast in interrogative form, reveal themselves as a series of questions that need to be answered in sequence, often by different levels in civil hierarchies.

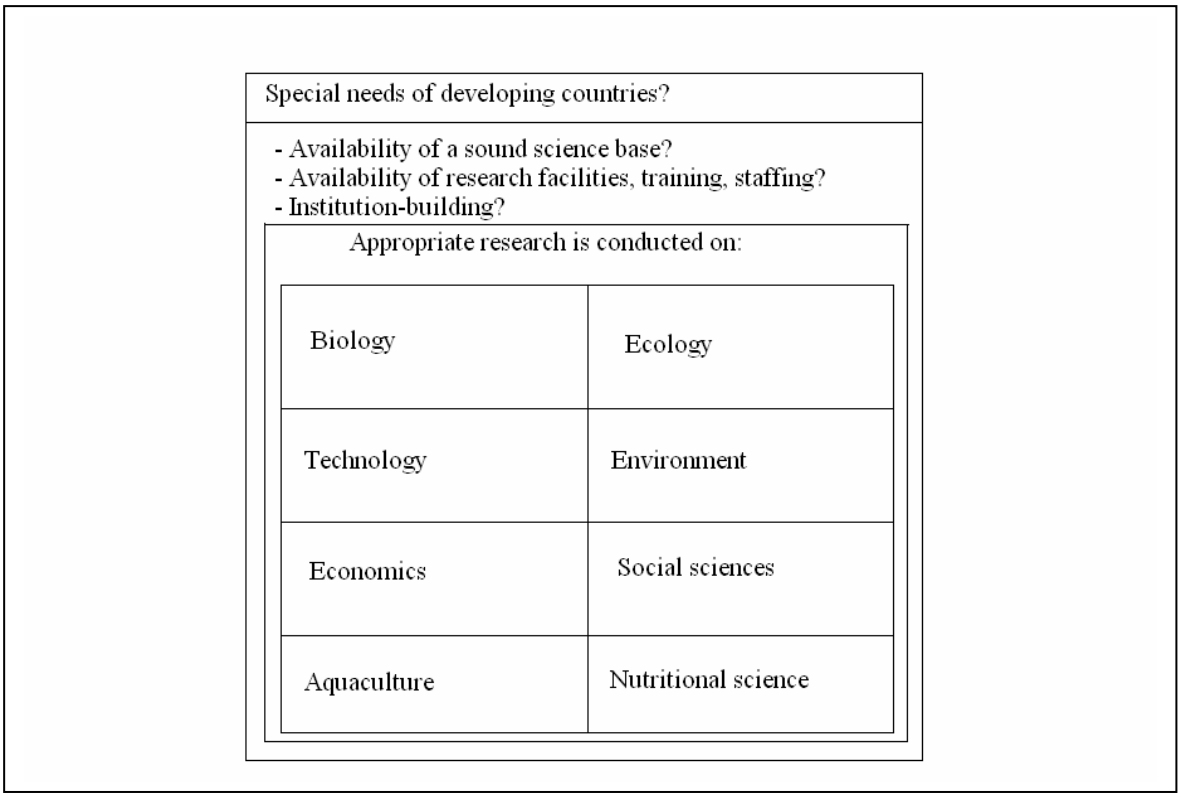

Figure 6: *Breakdown of the statements in Article 12.1 into components that can be answered individually in a technical questionnaire by different departments of the national fisheries infrastructure, concerned with international issues, science policy and research (after Caddy, 2000).*

2.10 Completion of the Code questionnaires

Several alternative approaches to scoring a questionnaire may be considered. Obviously, if a complete technical analysis is available to questionnaire respondents, partial adherence to a given provision of the Code could be quantified, but such an analysis would be costly and time consuming, and implies a higher degree of precision of information than is usually available on most aspects of the Code.

An analysis of the degree of adherence to the multiple statements in the Code must make the assumption that the correspondents have a degree of familiarity with the fisheries and ecosystems in question, and that this familiarity provides them with a useful basis for independent, individual judgement. Evidently, it would be best if each Article were answered

by the best-qualified group of experts in each field, and this exercise should ideally be preceded by an objective field analysis of the situation.

A simpler approach to an analysis of compliance was attempted in the Gulf of California workshop, as described in Section 3. Despite a general lack of quantitative data on Code adherence, nine well-informed respondents, each familiar with the fisheries situation, reviewed the Code prior to the meeting and completed the questionnaires independently. Thus the results reflected the independent opinions of each respondent. The following approach to scoring was used.

0 = this provision is not currently being applied in the Gulf of California.

0.5 = this provision is being partly applied.

1 = this provision is being applied.

3. EXAMPLES OF METHODOLOGIES USING QUESTIONNAIRES BASED ON THE CODE

3.1 Testing adherence of a regional fishery to the provisions of the Code in the Gulf of California, Mexico

A workshop held by WWF in Guaymas, Mexico, in June 2005 (Caddy *et al.,* 2005), used questionnaires based directly on the Code to evaluate whether the fisheries of the Gulf of California were in consonance with CCRF provisions. The workshop concluded that the questionnaire approach is an appropriate basis for a technical evaluation of the state of conservation and management of fisheries.

Through the Cancun meeting in 1992, the Federal Government of Mexico initiated the international process that led directly up to the Code and has since adopted it. Thus, there was no necessity to include items of the Code that deal specifically with international fisheries in reviewing application of the Code to the Gulf of California – a semi-enclosed sea within the jurisdiction of Mexico where local management bodies at state level have some jurisdiction. Issues that fell directly within the jurisdiction of the Federal government, such as international fisheries commissions and the United Nations high seas mandate, were therefore omitted from the questionnaires. Where such omissions were made, this was so indicated.

Since the Code has been approved at the national level, it has to be asked whether, and in what form, it would be useful to duplicate its provisions at a local level? Evidently, the statements in the Code have to be reinterpreted and applied successively by Regional or State governments (of federal countries such as Mexico), and perhaps in some jurisdictions, by municipalities, fish companies, cooperatives, or individual fishers.

A short meeting of a relatively small number of technical experts clearly cannot be expected to “short circuit” the participatory and political processes that will be needed to arrive at effective and responsible fisheries and ecosystem management in the Gulf. The workshop did, however, obtain and integrate individual responses to the questionnaires, and further developed the methodology proposed by Caddy (1996; 2000) for converting a code of conduct or any other set of norms and standards made up of a series of assertions, into a monitoring tool. This allows a semi-quantitative evaluation by experts of the current degree of adherence of fisheries of the region to the Code, and the workshop report may be a useful working document for discussion in various local and regional fora. Full details of the conclusions of the Gulf of California workshop are not included here, but left to be further developed by the organizers of the workshop in cooperation with national and local authorities – an approach followed for the other examples of Code questionnaire initiatives included in this report.

3.1.1 Use of a workshop for completing questionnaires

The approach taken for the Gulf of California workshop was to bring together experts on regional or national fisheries, as well as those stakeholders most dependent on the fisheries in question. This also provided an opportunity to explain some of the underlying principles of the Code before the questionnaires were completed. The questionnaires shown in Appendixes 1 and 2 were tested on an audience of regional experts on marine resources, through a process that involved the following steps.

(a) Questionnaires based on Articles 7-12 of the Code (Appendix 1), and two extra questionnaires developed at this meeting (Appendix 2), were completed independently by nine experts on regional fisheries for issues reflecting the provisions of the Code that apply to fisheries in national waters, as well as those issues relating to ecosystem principles and community-based management believed to be important by workshop attendees.

(b) Those provisions of the Code that apply to shared, straddling or highly migratory resources, or national responsibilities for high seas fisheries and fishery commissions, as well as to the role of international bodies, were left in abeyance as being more appropriate for consideration at the national level. In some such cases however, it was felt useful for management of local waters of the Gulf to rephrase international provisions for local implementation.

(c) While remaining within the spirit of the Code, its provisions were made more specific in order to take into account local conditions that apply to fisheries and ecosystems in the Gulf of California.

(d) Participants read the provisions of the Code and were provided with draft questionnaires prior to the meeting. Both English and Spanish languages were used in the meeting. However, since the questionnaires were prepared in English, the master document was formulated first in English.[15]

The two questionnaires on co-management and the ecosystem approach to management (Appendix 2) were reviewed by working parties to decide whether there was redundancy with questionnaires based directly on existing provisions of the Code. Although some similarities and cross-references were identified, the working parties considered that the two draft questionnaires were useful extensions to Code provisions and relevant to the local situation. They were thus retained.

While the main focus of work at the Guaymas meeting was on Articles 7 to 12 inclusive, introductory Articles of the Code were also taken into account in a general way.

The capacity of developing countries “to implement the recommendations of this Code'' is referred to in its Article 5, and certainly needs consideration. However, developed and developing countries share equal requirements for reliable advice and top quality analysis. There seems to be no implication in the Code that a lower quality and quantity of advice by national research institutions is acceptable for developing country institutions. The gist of Article 5 is that developing countries are constrained financially, and often by infrastructure, with regard to what scientific support they can provide to their national fisheries.

The provisions of the earlier Articles were considered as important general statements that should be borne in mind, but to a large extent are concerned with issues at a higher level than that of a technical fisheries evaluation as discussed here. In some cases their provisions are duplicated by the more detailed questions in later Articles.

[15] A list of the documents consulted during the workshop is provided in the bibliography.

3.1.2 Scoring responses and drawing conclusions

Excerpts from the questionnaire on the ecosystem approach are provided in Appendix 2C in order to illustrate the method of scoring responses and drawing conclusions from the scores by nine experts on Gulf of California fisheries. Pooling the responses of a number of independent correspondents allows an overall degree of agreement to be calculated as a percentage, even if the individual questions allow only three responses. The mean response X to the question was then expressed as a value in the range 0 to 1 as:

$X = \Sigma$ (Scores)/N where N is the total number of respondents.

A supplementary statistic was also derived which reflects the degree of agreement shown between respondents in choosing one of the three options – namely: 0, 0.5, or 1. The greatest number of respondents A showing an identical score was used to calculate a value Y = A/N, which can be considered a simple index of agreement between respondents.

In summary, for both approaches, a relatively low value for X or Y of < 0.5 was taken as a cut-off point. A value of $X < 0.5$ signifies an inadequate correspondence of the current situation in the Gulf of California to the provisions of that item of the Code, according to the overall score; a value of $Y < 0.5$ signifies an inadequate degree of agreement between individual respondents if less than half of the respondents shared the same score. A relatively high value of $Y \geq 0.5$ was considered to represent a satisfactory degree of unanimity of opinion by at least half of the respondents.

These two criteria, taken together, lead to three potentially useful conclusions, as follows:

(a) If $X < 0.5$ and $Y \geq 0.5$, this was assumed to mean that there was agreement by at least half of the respondents that the current situation in the Gulf of California does not meet the provisions of the Code.

(b) If $X < 0.5$ and $Y < 0.5$, this was interpreted to mean that while the current situation does not meet Code provisions, there was insufficient information to achieve agreement on the actual status of the fisheries with respect to this question.

(c) If $X \geq 0.5$ and $Y \geq 0.5$ for any question, at least half of the respondents felt there was a reasonable conformity of the fishery with this specific provision of the Code.

In practical terms, if conclusion (a) resulted, it was supposed that there is poor correspondence with the Code provisions, but at least a degree of unanimity of opinion. This implies that further ACTION is called for.

If conclusion (b) is met, implying both a negative correspondence to the Code and a poor agreement between experts on this question, this implies that further INVESTIGATION of the situation is called for.

3.1.3 Follow-up activities envisaged after completion of responses to the questionnaires

The methodology outlined here should have some general relevance both for national and local governments, and for NGOs and other stakeholder groups with an interest in monitoring public performance in relation to the FAO Code of Conduct. The methodology can be applied with reference to the Code generally or for specific Articles of the Code – such as on Aquaculture, for example. It is recognized that the responses will depend to a certain extent on the interests and skills of correspondents, who may represent all manner of groups, whether:

(a) Government officials responsible for fisheries management;

(b) Scientific and technical advisors;

(c) Representatives of society, from regional governments to local communities fishers;

(d) Associations or cooperatives;

(e) Fishing enterprises and boat owners/Fish farmers;

(f) Fish processors;

(g) Consumers;

(h) NGOs; or

(i) The interested public.

A workshop can be a helpful means of ensuring standardized responses to the questionnaires. Once these have been obtained, follow-up actions could include:

(a) discussing the report of the workshop with officials responsible for ecosystem and resource management in the region being evaluated, or the specific resource in question;

(b) diffusing the completed questionnaires and other preliminary results from the workshop to the fishing industry and the public through the media, so that public debate on fisheries management issues will be informed by the Code status of the fishery;

(c) in-depth investigation of those responses to the questionnaire where both a low score for key questions and significant disagreement as to the appropriate response to that provision of the Code is apparent;

(d) repetition of the exercise at intervals of several years, perhaps by "mini-codes" for each of the major fisheries in the region in question, using the stakeholders for each fishery as respondents; and

(e) addressing the status of different Articles of the Code independently to facilitate priority setting for remedial action, which could lead to a management plan for fisheries or for ecosystem conservation, and possibly to the formulation of one or more development projects.

3.2 Evaluating compliance of the Hawaii pelagic longline fisheries with Code Articles 7, 8, 10, 11 and 12[16]

3.2.1 A brief description of the fishery

Hawaii pelagic longline fisheries include approximately 125 active vessels that target deep-swimming bigeye tuna (the tuna longline fishery), with some vessels also targeting swordfish seasonally (the swordfish longline fishery). These vessels land fresh chilled, high-quality (*sashimi*) tuna, swordfish and associated pelagic fish species. Today's modern longline fleet in Hawaii operates under a United States government-mandated limited entry programme that has been in place since 1994, capping Hawaii longline permits at a maximum of 164 vessels. Permitted vessels operate within the United States exclusive economic zone surrounding the Hawaii Islands Archipelago as well as in the international waters of the central North Pacific Ocean.

3.2.2 The fishery management system

Hawaii pelagic longline fisheries are managed by the National Oceanographic and Atmospheric Administration (NOAA) Fisheries Service of the United States Department of Commerce. NOAA's Pacific Islands Regional Office (PIRO) plays the central role in regulation and both NOAA and the United States Coast Guard (USCG) have key enforcement roles. NOAA's Pacific Islands Fisheries Science Center (PIFSC) and the Pelagic Fisheries Research Program (PFRP) at the University of Hawaii provide the fishery-dependent monitoring data and fishery-independent research required for science-based fishery

[16] This section utilizes text kindly provided by Paul Bartram, John Kaneko and George Krasnick of PacMar Inc.

management. The Western Pacific Regional Fishery Management Council ("the Council") is one of the eight regional fishery councils established in 1976 by federal action (Magnuson Fishery Conservation and Management Act) to manage United States fisheries so that optimum yield is achieved while preventing overfishing. The Council develops and amends Fishery Management Plans (FMPs) by a process that incorporates input from fishery scientists, managers and a range of stakeholders.

The Council's FMP for pelagic fisheries, including Hawaii longline fisheries, was first implemented in 1987 and continues to be amended to address changing circumstances. The amendment process evaluates several management alternatives before the Council submits a preferred action to NOAA for consideration, rule making and implementation. All limited entry permit holders in Hawaii longline fisheries are members of a non-profit industry organization, the Hawaii Longline Association (HLA). HLA actively participates in the Council process of formulating proposals for conservation and management actions.

3.2.3 Intent and purpose

The Hawaii Seafood Project (NOAA Grant NA05NMF451112 awarded to PacMar Inc. of Honolulu, Hawaii) is an effort to apply the Code to assess Hawaii longline fisheries and management systems. This application of the Code is for a specific fishery, not all pelagic fisheries in the State of Hawaii or in other regions of the United States of America.

3.2.4 What industry problem prompted the use of the Code?

Hawaii longline fisheries are some of the most highly regulated in the United States of America but their performance is not well understood by the general public. Federal managers focus on fish stock assessments to determine whether fishing controls should be adjusted when there is a determination of "overfishing" or "overfished" conditions. Several non-governmental organizations issue seafood consumer advisories that combine factors such as sustainable fish stocks, fish by-catch and incidental capture of protected species, in a ranking system based on particular stocks, fishing methods and in some cases specific fisheries. However, no comprehensive evaluation of Hawaii longline fisheries is available that considers all aspects of responsible fisheries.

3.2.5 Methodology: scorecard development

After reviewing the Code, the project team decided to focus its assessment on five prescriptive Articles. These include Article 7 (Fisheries Management), Article 8 (Fishing Operations), Article 10 (Integration of Fisheries into Coastal Area Management), Article 11 (Post-Harvest Practices and Trade), and Article 12 (Fisheries Research).

Caddy (1996) reformulated many provisions of the detailed and prescriptive articles of the Code (Articles 7-12) into a series of specific questions with minimal interpretation or editorial changes from the original Code text. In the Hawaii Seafood Project's scorecard for Hawaii longline fisheries, questions from Caddy (1996) were used verbatim where available, and the remaining provisions of Articles 7, 8, 10, 11 and 12 were transformed into question format by PacMar Inc.

For clarity, the original language of the Code and the corresponding questions generated by Caddy (1996) and PacMar Inc. are included for each scorecard provision. A short answer to each question describes how well Hawaii longline fisheries comply with each of the Code provisions evaluated. Each answer is referenced with citations and where possible, web-links to rules, regulations and other references to justify the score and to provide sources of additional information.

The scoring system developed by Caddy (1996) was used, in which a full score of 1 was assigned where compliance is complete, a score of 0.5 was given where there was partial or incomplete compliance, and a score of zero where the fishery is not compliant, or compliance

is uncertain. Scores were summed for each of the five Articles evaluated and divided by the total possible score to derive a percentage compliance for each Article.

An excerpt of the scorecards used for Hawaii longline fisheries is provided in Appendix 3.

3.2.6 The Assessment Team and information gathering

The project team of five consisted of the Task Manager (Paul Bartram), two research assistants, an environmental/fishery policy specialist (George Krasnick) and the project Team Leader (John Kaneko). Senior team members have a long history and broad scope of consulting, research and practical experience in the Hawaii fishing and seafood industry and its management. This team believes that the Code is the most comprehensive framework available to evaluate Hawaii longline fisheries. The team answered scorecard questions based on the provisions of the Code in Articles 7, 8, 10, 11 and 12. Information sources included federal regulations and guidelines, personnel in the various agencies and organizations involved in the fishery management system, published literature and information available on the web.

3.2.7 Involvement of fishery management agencies

In the early stages of the project representatives of NOAA agencies, the Council, the PFRP and the USCG were briefed on the purpose and objectives of the Responsible Fishery Assessment component of the Hawaii Seafood Project. Their assistance was requested at that time, as well as in later stages of reviewing, editing and verifying draft scorecards for Hawaii longline fisheries developed by the project team. The Council and NOAA PIRO reviewed the draft Article 7 (Fisheries Management) scorecard. NOAA PIRO, NOAA PIFSC, the Council and the USCG reviewed the draft Article 8 (Fishing Operations) scorecard. PFRP reviewed the scorecard for Article 12 (Fisheries Research). Article 10 (Integration with Coastal Zone Management) and Article 11 (Post-Harvest Activities) underwent internal review. The project team addressed reviewer comments to improve the initial drafts.

A workshop was held to share the results with representatives of the agencies to review the methodology, summary scores for the fisheries and implications of the application of the Code. The workshop discussion addressed the potential future application of the Code as an assessment tool for documenting fishery management, additional quantitative measures of fishery performance and in programme planning.

3.2.8 Interaction with FAO

The project team contacted the FishCode Programme, FAO, to alert the Organization about the Hawaii Seafood Project's assessment of Hawaii longline fisheries based on the Code. The team has continued to interact with FAO on the application of the Code to Hawaii longline fishery scorecards. The questionnaire format in Caddy (1996) was used to score this fishery using the provisions of Article 7-8 and 10-12.

3.2.9 Lessons learned

The Hawaii Seafood Project's assessment of Hawaii longline fisheries produced a holistic perspective of the diverse management systems that cause these fisheries to be some of the most highly regulated in the United States of America. This application of the Code has demonstrated that numerous agencies and organizations contribute to a systematic, sophisticated and science-based management system. The assessment details specific agency roles and contributions in generating high responsibility scores for Hawaii longline fisheries.

Communicating the findings to the public is another challenge. Summary scores should be readily understood by the public. Scoring of the longline fisheries should help to guide consumers in being responsible by purchasing and consuming sustainable seafood.

The Responsible Fisheries Assessment of Hawaii longline fisheries should be considered a work in progress. It can serve as an on-going record of changes and progress made towards achieving and maintaining a responsible fishery. Readers of the document can substantiate the scoring by linking to supporting information. The Responsible Fisheries Assessment can also serve as a planning tool to identify and rectify possible gaps in responsible fisheries management.

Engaging agencies directly in the assessment process is essential. The on-going participation of the organizations that play direct and important roles in fishery management is the basis of the credibility of the assessment, not a third party's judgment of agency roles and responsibilities.

It is hoped that the Responsible Fisheries Assessment will be viewed as an important outreach function of each agency involved in managing Hawaii longline fisheries. Initial efforts of the Hawaii Seafood Project have built a foundation for a tool that can generate scores that should be easily understood by the public. Ideally, the agencies will be encouraged to maintain the scorecard's description of their respective roles as a valuable outreach activity and one in which the collective fishery management system in Hawaii can be seen in a positive light and serve as a model for others.

The scorecards must be maintained and updated as Hawaii longline fisheries and the management system continue to evolve. Other more quantitative types of measures might be developed and used to complement and enhance the value of fisheries assessments based on the Code.

3.3 Evaluating a fisheries research programme from the perspective of Article 12: an "idealized" example

Frequently, senior scientists from outside a national research context are called upon to evaluate the output from a fisheries research institute, and this can be a useful exercise that helps to maintain a balanced approach to research. Such exercises can also help in satisfying the information requirements of the fishing industry and the management body concerned, as well as in the conservation of national and international fisheries resources and environments. It is assumed, of course, that the evaluator is familiar with national research publications, and has held discussions with scientific staff on work and programmes.

The following hypothetical example closely parallels an analysis of the work of a national institute carried out by Caddy, and has been modified in details and content to preserve anonymity. This evaluation of performance is strictly in relation to Article 12 of the Code, which deals with applied fisheries research, and not other scientific criteria such as the need for basic research.

A series of 451 publications and pamphlets describing the work of the staff of a group of geographically-dispersed fisheries research institutes with broad terms of reference was provided to the evaluator, including documents on research policy (not specified below). The research documents were scanned rapidly to determine the coverage by main subject areas, without any attempt to evaluate either quality or accuracy of information.

A rapid analysis of the titles of studies yielded the summary list shown in Table 2. In some cases titles mentioned more than one subject area. If a subject area was included in a title, it was generally added to the summary list, even if the study itself mainly focussed on other aspects.

Evidently a high percentage of these studies either covered some aspect of aquaculture (first ranked category), or dealt with biology, fishery surveys, or a description of fisheries (second ranked category). Many biological studies were descriptive in nature.

Table 2. A breakdown of recent publications by hypothetical research institute 'X' by main subject area over a 10-year period

Rank	Category	Number of documents
1	Aquaculture/Mariculture	155
2	Fishery biology, stock assessments/status of fisheries	115
3	Environmental studies	74
4	Fishing technology (including gear, boats and fixed gears)	39
5	Sociology, economics	20
6	Marine ecology	19
7	Resource management	12
8	Nutritional science, fish inspection and product transformation.	11
9	Information science	3
10	Marketing	1
11	Assisting developing countries	1
12	Discards	1
	Total	**451**

The next step was to determine whether the work of the institute is distributed in an equitable way over the main clauses of Article 12 of the Code, based on the titles and abstracts. This more detailed analysis yielded the results shown as Table 3.

The scoring per individual publication is given as follows.

(a) No investigation recorded (0).

(b) Minor/inadequate research carried out (1).

(c) A significant research programme carried out (2).

(d) A major research programme carried out (3).

The overall score (S) for each item is given out of the maximum possible (P) as a fraction S/P.

An overall scoring of 60+ should be regarded as very satisfactory, especially since this scoring preceded attempts to bring the fisheries monitoring and regulatory system into line with the provisions of the Code. Weak points related to a lack of emphasis on the impacts of fishing gear on the ecosystem, and the use of traditional knowledge. Rather than being definitive, the score could be a useful starting point for discussions between institute directors and their staff, and between research staff and those responsible for implementation fisheries management measures. A similar approach could be adopted for other Articles of the Code.

Supplement F at the end of this report shows a table on the scoring of compliance with Article 12 clauses followed by reviewer comments on the status of compliance. It was recognized that in some cases compliance with Code specifications was a Governmental responsibility (G), and fell outside the institute's terms of reference (R). This was taken into account if specified in the documents or interviews. Recommendations to the overview committee were provided, as appropriate, following the comments on each clause. [17]

[17] Individual biases from having a single evaluator would be reduced if the overview committee had appointed a small evaluation committee for this task, consisting of individuals with diverse skills in the main subject areas covered.

Table 3. Scorings for Article 12 for institute X (a maximum score of 3 is given for each item separated by a forward slash (/))

Clause	Questions	Score	Max Score
12.1	Is the scientific basis for management measures adequate?/ Is appropriate research carried out? /Are research facilities adequate? / Is technical training of staff adequate? / Is the institutional structure for research and advice giving appropriate? / Is there technical support to developing countries?	12	18
12.3	Data analysed?/ Confidentiality conserved? / Is timely advice given? / Are research data published? / Is there dissemination and popularization of advice? / Is understandable advice given? / Is appropriate new research started to answer current questions?	15	21
12.4	Are data collected reliable? / Are relevant data on the catch collected? / Are data on discards collected? / Is data collected on waste? / Is there appropriate data aggregation? / Are data reaching clients?	16	18
12.5	Is the State monitoring resources? / Is it supporting evaluation of the impacts of fishing on stocks? / The impacts of fishing on habitats? / The impacts of pollution? / The impacts of climate change?/ Other environmental impacts?/ Impacts of human activities on ecosystems?	15	21
12.6	Are research capabilities adequate?	2	3
12.7	Is there international research cooperation? / Is there optimal use of fish resources? / Is there research on fish for food?	6	9
12.8	Is there monitoring of available supplies of fish for food? / Are adverse effects of fish quality on consumer health monitored?/ Is there public dissemination of health risks?	6	9
12.9	Is research carried out on fisheries economics? / On social science in relation to fisheries communities? / On marketing? / On the adequacy of institutional structure and arrangements? / Are adequate data collected for policy analysis?	10	15
12.10	Is research carried out on gear selectivity? / Are gear impacts on target species evaluated? / Are the impacts of gear on behaviour of target or non-target species evaluated? / Are the impacts of gear on biodiversity or habitat being evaluated?	9	16
12.11	Are impacts of gear on the ecosystem being evaluated? / Impacts of the fishery on the ecosystem?	2	6
12.12	Are studies of traditional knowledge applied to fisheries carried out? / Are they applied to managing the fishery?	3	6
12.13	Are research results used for setting management objectives? / Are reference points established? / Are performance criteria for research set and evaluated? / Are performance criteria for fisheries management established? / Is linkage between research and management adequate?	9	15
Totals:	**Overall percent score = 66.9%**	**105**	**157**

3.4 An alternate approach to using multidisciplinary tools and indicators: the RAPFISH methodology

Fisheries are multidisciplinary human activities with profound social, technological and ethical implications (McGoodwin 1990), and fisheries management is increasingly seen as more concerned with managing human behaviour (e.g. Lane and Stephenson, 1997), than just with fish biology and ecology. The human components of fisheries management are usually treated qualitatively, being concerned with vessels, markets, economics, allocation and access rights. After a management failure, the fishing industry has to contend with the rebuilding of depleted and collapsed stocks, and this can involve serious socio-economic hardship.

RAPFISH is a non-parametric and multi-disciplinary ordination technique for comparing the status of fisheries (Pitcher *et al.,* 1999; Pitcher 1999). RAPFISH is not intended to replace conventional stock assessments for setting quotas etc, but the underpinning of the method, as for the others described in this report, is that there is a serious mismatch between the stock assessment models currently used for stock evaluation, and the high degree of uncertainty inherent in fisheries due to their multidisciplinary nature (Walters 1998). As for most of the methodologies referred to in this report, RAPFISH serves as a means to gain an overall picture of the multidimensional context within which a fishery operates.[18]

In some senses the methodology is similar, but mathematically more complex, than the AMOEBA method already described. It also involves a degree of judgement in its application. A set of attributes are constructed based on pre-set criteria which are supposed to represent the best ("good" = 100%) and worst ("bad" = 0%) fisheries conceivable. The input data are subject to multidimensional scaling using fixed reference points so generated, with sets of attributes extracted for a range of disciplines. Thus, it is possible to set axes corresponding to ecological, technological, economic, and social evaluations, and an ethical evaluation can also be incorporated. These MAY in combination give an index of sustainability. Pitcher (1999) reported that detailed evaluations can also be provided by a hierarchy of sectors, gear types, species and geographical areas. The technique is still under development, but is intended to underpin policy decisions in fisheries. Multidimensional scaling (Kruskal and Wish 1978; Schiffman *et al.* 1981; Stalans 1995) is employed as the ordination technique, and produces "maps" of relative location which may be rotated and shifted linearly. A practical detail is that the statistical ordination method underpinning the method requires approximately three times as many fisheries to be included as the number of attributes measured by indicators. Pitcher gave an example of ordination fields with 7-10 attributes as ideal for dealing with 10-30 fisheries, but noted that the analysis may incorporate around 20 hypothetical fisheries constructed from random attribute scores.[19] In practical terms, RAPFISH is designed for comparing a group of fisheries, or the status of a fishery sampled at intervals over time.

In adapting the RAPFISH procedure to the CCRF, Pitcher (1999) attempted first to express compliance using only those features explicitly mentioned in the Code, but found that much of the detail in the body of its text Code was not easy to systematize, and that scoring of compliance proved difficult. He noted that, "While some clauses relate to very specific points, others cover almost every fishery management device ever invented, and in addition many items are repeated". The evaluation for scoring compliance to the Code was partly based on an earlier analysis of the provisions of the Code for Article 7 (Caddy 1996). However, Caddy's list of 108 questions under Article 7 had to be considerably reduced for use in RAPFISH, and the specific provisions in many individual clauses were merged. Some general objectives of the Code were derived from Article 2 (Table 4).

As with the official FAO questionnaire, Pitcher (1999) suggested a simple way of examining a State's overall progress in implementing the Code – namely, to ask States to rate themselves between one and ten for each of the ten objectives of Article 2 in Table 4. Expressed as a percentage, this would cover the aggregate of a country's fisheries rather than their individual fisheries, which is the main focus of the RAPFISH method. A standard of comparison might be provided by scores for three periods: a time prior to the Code (e.g. 1990), for the present day, and for five years in the future after present initiatives had been fully implemented.[20]

[18] See also www.fisheries.ubc.ca/projects/rapfish.php.

[19] For further technical details, see Pitcher *et al.*, 1999.

[20] This same procedure can be used for the original method proposed in Caddy, 1996.

Table 4. Summary of the ten clauses of Article 2 from the Code of Conduct for Responsible Fisheries (modified from Pitcher, 1999 and Article 2).

Clause	Objective
2 a)	Establish principles for responsible fishing, with all biological, technical, economic, social, environmental, community aspects addressed
2 b)	Establish principles and criteria for elaboration and implementation of national policies for responsible conservation, management and development of fisheries resources
2 c)	Serve as a reference to help establish appropriate management measures based on a legal and institutional framework
2 d)	Provide guidance for the formulation and implementation of international agreements
2 e)	Facilitate and promote technical and financial cooperation for conservation, management and development of fisheries resources
2 f)	Promote the contribution of fisheries to food security and food quality, with priority to the nutritional needs of local communities
2 g)	Promote protection of living aquatic resources, their environments and coastal areas
2 h)	Promote fair trade in fish and fish products avoiding measures constituting hidden barriers to trade
2 i)	Promote research on fisheries, their ecosystems and relevant environmental factors
2 j)	Provide standards of conduct for all involved in the fisheries sector

One possible characteristic of the official FAO questionnaire noted by Pitcher (1999) is that self-scoring may encourage optimism, and he suggested that scores from both governmental and non-governmental sources be compared for each country. In other words, scoring compliance is likely to be less optimistic if seen from outside the official fisheries management hierarchy than from within. This perhaps explains public support for the role nowadays carried out by some NGOs in evaluating government performance in fisheries and other sectors. Nonetheless, the different approaches used in Appendixes for the detailed questionnaires, and in Supplement A for the official FAO questionnaire, may both be used as source material for designing a questionnaire appropriate to the local situation.

Individual attributes for the RAPFISH analysis of the Code were largely based on Caddy's (1996) checklist of questions. Pitcher (1999) reiterated a conclusion of the earlier study, namely that a single clause of the Code covers a large number of different management devices, and that similar principles are embedded in several clauses. He noted, for example, that the substance of *7.1 – General,* is largely repeated elsewhere in Article 7 as well as in Articles 6 and 10. Such repetitions between clauses and Articles make a formal mathematical ordination, based on provisions of individual clauses alone, rather difficult. In order to express intentions or effects as required by Article 4.2, the Code's provisions had to be re-arranged into other subsections while attempting to avoid the Code's repetition yet at the same time retaining a similar overall balance of focus. This can only be done very approximately, as shown for example in Figure 7.

The substructure of Article 7 was rationalized into six RAPFISH fields, each of which was ordinated separately and summarized by a separate score. The results can be expressed on a kite diagram, as shown in Figure 8, similar to that in the AMOEBA method shown in Figure 2.

The view taken here is that while the RAPFISH methodology, applied specifically for assessing compliance with the Code, represents a potentially useful tool for evaluating a suite of fisheries, it does not fit particularly well with the Code's format unless separate clauses are merged. A significant but imprecise degree of subjectivity and value judgement is inevitable in effecting such merging, as well as in creating the "hypothetical" fisheries situations needed by the ordination routines. Not all users of the procedure are likely to follow the same criteria.

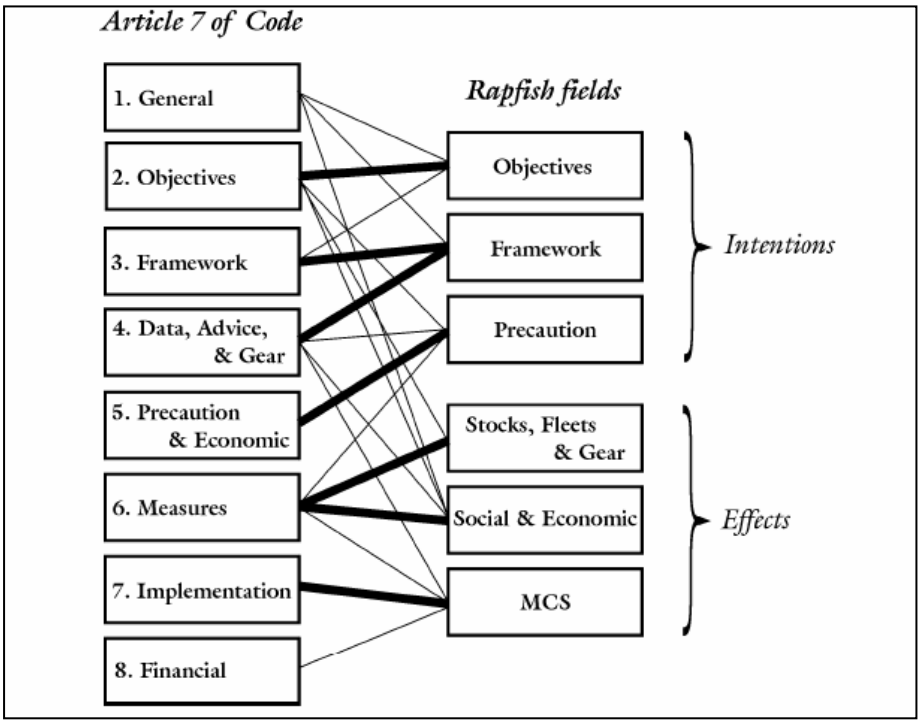

Figure 7. *Illustration of how subsections of Article 7 of the Code are mapped onto RAPFISH fields. Thick lines show main linkages, and thin lines minor linkages (from Pitcher, 1999).*

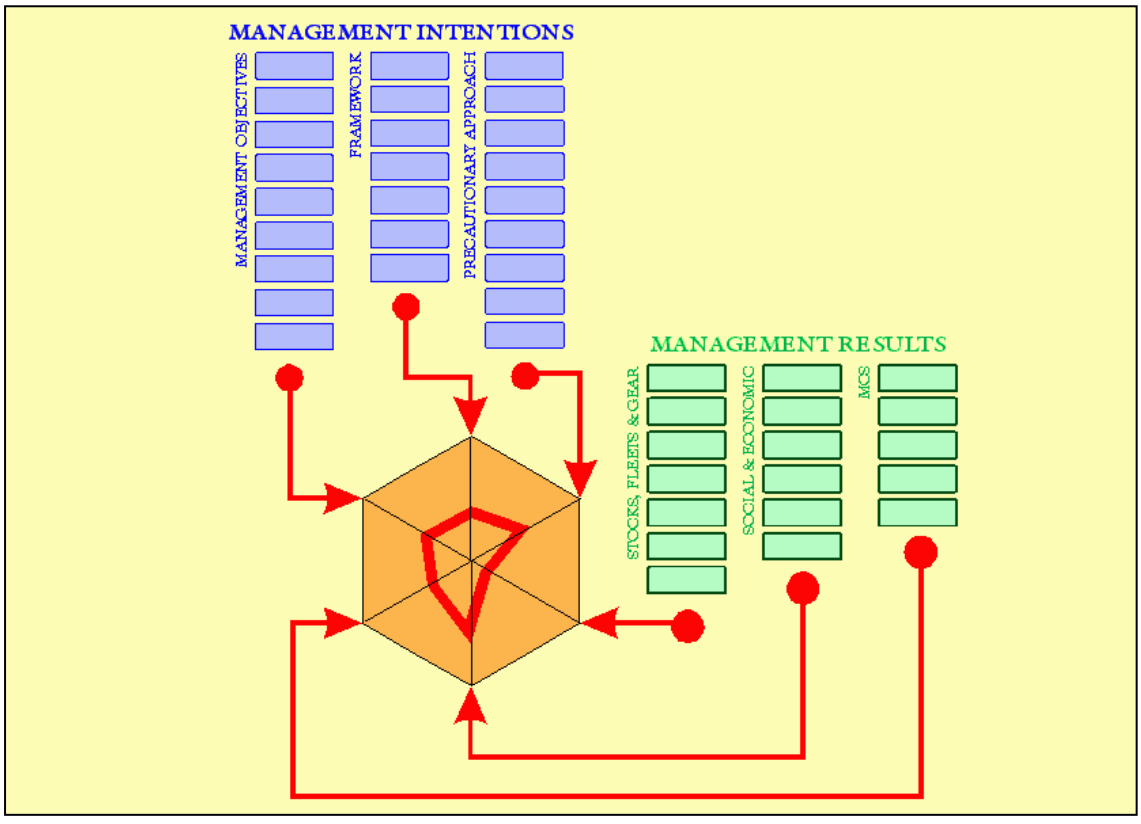

Figure 8. *Depiction of Rapfish results using a kite diagram. Axes in the diagram represent the scale of each management attribute (here referring to the management intentions and results (effectiveness) according to the attributes of the CCCF). The thick red line inside the diagram represents the scores of a country in each field (from Pitcher* et al.*, 2006).*

It has to be agreed with Pitcher (1999) that the Code contains a good deal of repetition, but this perhaps represented key preoccupations of the delegates during the approval process. Inevitably, the Code cannot provide a mathematically exact criterion, and other sets of criteria are of course feasible. However, "streamlining" the Code down to a smaller number of criteria will also remove some of the specific criteria that are important at the technical level. The Code incorporates multiple criteria by which the performance of a fishery can be judged, and constitutes a corpus of value judgements arrived at by international negotiation involving more than 100 countries. For purposes of assessing compliance, the evaluators, and the users of the evaluation, must be able to trace the responses back to particular clauses of the Code.

4. THE POTENTIAL ROLE OF NON-SPECIALIST ORGANIZATIONS IN MONITORING FISHERIES PERFORMANCE

A number of NGO's, and potentially also Inter-Governmental Organizations that are not primarily concerned with fisheries, may feel the need to monitor adherence of fisheries to CCRF provisions for a particular reason, yet are not be in a position to confirm science-based assessments by national governments. They might find the questionnaires in this report a useful basis for evaluating, for example, whether the status of a particular fishery justified the use of a subsidy for achieving a national objective in the sector. At the same time, while following the questionnaire procedure described herein, they might prefer to seek more general criteria for precautionary management. A shorter and simpler approach might then be developed, which would nonetheless be compatible with the Code. Such an approach might have the format and basic criteria shown in Appendix 4.

5. SUMMARY

This paper has reviewed a developing field – namely, the use of questionnaires to monitor the compliance of countries and specific fisheries with the provisions of the *Code of Conduct for Responsible Fisheries*. Several different applications have been described without intending to impose a standard approach, and further developments of these questionnaires are to be expected. In general, the Code, along with its specific articles or associated instruments and technical guidelines, provides a framework for a set of principles that can be added to or modified by different parties to meet the widely varying situations encountered on the fisheries scene, as long as the spirit of the Code is adhered to. The questionnaire approach was demonstrated to be a useful way of converting a framework international instrument into a means of judging compliance with it. Further, questionnaires are relevant not only at the political level; they are also of broad utility in technical evaluation, especially where quantitative information is scarce. When used at the operational level, however, they will often have to incorporate issues that are not specified in detail within the framework instrument.

6. DISCUSSION

A systematic approach to using semi-quantitative information as a basis for management action has rarely been investigated in fisheries. As noted, in many other fields of action, the questionnaire approach has been widely used as a basis for political action. The criteria of the International Organization for Standardization are useful in checking more systematically whether the application of norms and standards is acceptable in particular technical applications. The questionnaire approach, although obviously a useful strategy for gaining consensus in decision-making, has some hidden complications. These may be listed as follows.

(a) It is important to ensure that those completing the questionnaire are experts or have first-hand familiarity with the situation under review.

(b) It is desirable that a majority of respondents to the questionnaire are not either committed to showing that the current situation is more satisfactory or, alternatively, less satisfactory than it actually is.

(c) Hence it is important that a suitable mix of respondents be chosen. This should also allow a desirable feature of analysis of the results to be achieved – namely, the derivation of a confidence interval for responses to specific questions.

(d) Mailing the questionnaire may lead to bias if only those in favour or against current management measures respond. It is therefore recommended to use a workshop format where the provisions of the Code can be explained prior to completion of a questionnaire.

(e) Providing the respondents and other interested parties with the summarized results and provisional conclusions from the questionnaire is important if repeated exercises are envisaged in the future.

(f) This also makes it important to consider what method will be used to summarize, interpret and display the results.

A brief review of management approaches in fisheries has pointed to recent developments in fisheries assessment science that require a wider basis of information for proper decision-making. The use of indicators and reference points for resource, ecosystem, bio-economic and social considerations was highlighted. Reference points in particular are values of indicators that are needed by management if there is to be feedback from fishery outputs to the inputs controlling the level of fishing mortality the resource is subject to. It was pointed out how a questionnaire approach can be used to formulate arbitrary reference points once the validity of expert judgement by those familiar with the situation is acknowledged. The relatively narrow focus of fisheries assessment work has been broadened recently to take into account environmental and ecosystem considerations, including the degradation of coastal waters by other human activities. Hence coastal fisheries also lie within the Integrated Coastal Area Management (ICAM) context, and must in addition now take into account social and economic considerations. Incorporating such a broad spectrum of relevant information is largely impossible to model mathematically, but any decision-making methodology and infrastructure should have access to a summary of the status of the resource and its environment classified by relevant considerations. A methodology of display and synthesis of the resulting data is therefore important. It was shown how the AMOEBA and the Traffic Light methodologies can display results of a questionnaire based on one or several Articles of the Code in such a way that priorities for corrective action are evident. A broad approach based solely on the Code will not totally satisfy the requirement for decision-making. Tools based on analyses of the state of exploitation of the resource, or the economic returns it is yielding will also be required, and it will be useful to prioritize modelling exercises based on the overview provided by a Code questionnaire.

It is clear that the Code is fairly equally balanced as an instrument for measuring inputs and outputs from the fishery. Where these are not in balance, it seems unlikely that management measures based on feedback of information will be successful.

7. BIBLIOGRAPHY

Alverson, D.L. 2004. Searching for ecosystem reality – terms and concepts. *Bull. Mar. Sci.* 74(3): 639-652.

Berkes, F. 2005. Commons Theory for Marine Resource Management in a Complex World. Chapter 13. In N. Kishigami & J.M. Savelle, eds. *Senri Ethnological Studies*, 67: 13-31. *Indigenous Use and Management of Marine Resources*.

Caddy, J.F. 1996. A checklist for fisheries resource management issues seen from the perspective of the FAO Code of Conduct for Responsible Fisheries. *FAO Fisheries Circular* No. 917, Rome, FAO, 1996, 22p.

Caddy, J.F. 2000.Viewpoint. The Code of Conduct for Responsible Fisheries as a basis for evaluating fisheries research: a suggested operational procedure. *Fisheries Research* 48 (2000), pp. 205-211

Caddy, J.F. 2004. Current usage of fisheries indicators and reference points, and their potential application to management of fisheries for marine invertebrates. *Can. J. Fish. Aquat. Sci.,* 61: 1307-1324.

Caddy, J.F. 2006. *The potential use of indicators, reference points and the traffic light convention for managing Black Sea fisheries*. Paper presented at the GFCM/SAC Workshop on Reference Points for Mediterranean Fisheries, Rome, Italy, 20–21 April 2004. General Fisheries Commission for the Mediterranean, Studies and Reviews, No. 83. FAO, Rome. pp. 1-24.

Caddy, J.F. & Agnew, D. 2004. An overview of recent global experience with recovery plans for depleted marine resources and suggested guidelines for recovery planning. *Reviews in Fish Biology and Fisheries*, 14: 43-112.

Caddy, J.F. & Mahon, R. 1995. Reference points for fisheries management. *FAO Fisheries Technical Paper*, No. 347:83p.

Caddy, J., Cisneros-Mata, M.A., Rodríguez-Valencia, J.A., & Berkes, F. 2005. Desarrollo de un Código de Conducta para la Pesca y Acuacultura Sustentables en el Golfo de California. Reporte de Taller de Trabajo. WWF-México, Programa Golfo de California. 44p. (http://www.wwf.org.mx/wwfmex/publicaciones.php?tipo=reps&p=gc)

Caddy, J.F., Wade, E., Surette, T., Hebert, M. & Moriyasu, M. 2005. Using an empirical traffic light procedure for monitoring and forecasting in the Gulf of St. Lawrence fishery for the snow crab, *Chionoecetes opilio. Fisheries Research*, Vol. 76 (1) October 2005, pp. 123-145.

Cochrane, K.L., Butterworth, D.S., De Oliveira, J.A.A. & Roel, B.A. 1998. Management procedures in a fishery based on highly variable stocks and with conflicting objectives: experiences in the South African pelagic fishery. *Rev. Fish Biol. Fisheries* 8: 177-214.

Doulman, D. 1998. The Code of Conduct for Responsible fisheries: the requirement for structural change and adjustments in the fisheries sector. [FAO Web site].

FAO. 1995. *Code of Conduct for Responsible Fisheries*, Rome, 41p.

FAO. 1999. The development and use of Indicators for sustainable development of marine capture fisheries. *FAO Technical Guidelines for Responsible Fisheries* No 8, Rome, 79p.

FAO. 2003. The ecosystem approach to fisheries. Issues, terminology, principles, institutional foundations, implementation and outlook. *FAO Fisheries Technical Paper* No. 443. Rome, FAO. 71p.

FAO. 2004. Creating legal space for community-based fisheries and customary marine tenure in the Pacific: issues and opportunities. *FishCode Review.* No. 7(En). Rome, FAO. 2004. 65p.

Garcia, S.M. 1996. The precautionary approach to fisheries and its implications for fishery research, technology and management: An updated review. In: Precautionary approach to fisheries, Part 2. Scientific Papers. *FAO Fisheries Technical Paper* No. 350/2, pp. 1-76. Rome, FAO.

Garcia, S.M. 2000. The FAO definition of sustainable development and the Code of Conduct for Responsible Fisheries: an analysis of the related principles, criteria and indicators. *Mar. Freshwater Res.,* 51: 535-41.

Garcia, S.M. & Staples, D.J. 2000. Sustainability reference systems and indicators for responsible marine capture fisheries: a review of concepts and elements for a set of guidelines. *Mar. Freshwater Res.*, 51: 385-426.

Gréboval, D. 1999. Managing fishing capacity. *FAO Fisheries Technical Paper* No. 386.

Gréboval, D. & Munro, G. 1999. Overcapitalization and excess capacity in world fisheries: underlying economics and methods of control. In: Greboval, D. (ed). Managing fishing capacity. *FAO Fisheries Technical Paper* No. 386, 206p.

Halliday, R.G., Fanning, L.P. & Mohn, R.K. 2001. Use of the traffic light method in fishery management planning. *Canadian Science Advisory Secretariat, Res. Doc.* 2001/108, 41p.

Holt, S.J. & Talbot, L.M. 1978. New principles for the conservation of wild living resources. *Wildl. Monogr.* 59, 33p.

ICRI. 2004. International Coral reef Initiative (ICRI) – ICRI Scorecard. (Doc. ICRI GM (1) 2004/10.3); General Meeting, Okinawa, Japan, 3-4 July (2004); 20p.

ISO. 2006. ISO Standards Compendium: ISO 14000 — Environmental Management. 2001, Ed. 2, 588 p., ISBN 92-67-10328-8

Kendall, R.L. 1999. Sustainability. *Fisheries* Vol 24(3).

Kirkwood, G.P. 1992. Background to the development of Revised Management Procedures. *Rep. Int. Whal. Commn.* 42, 236-243.

Kruskal, J.B. & Wish, M. 1978. Multidimensional scaling. Sage Publications, Beverley Hills, CA, United States of America.

Kuemlangan, B. 2004. Creating legal space for community-based fisheries and customary marine tenure in the Pacific: issues and opportunities. *FAO FishCode Review*. No. 7*(En)*. Rome, FAO. 2004. 65p.

Laane, W.E.M. & Peters, J.S. 1993. Ecological objectives for management purposes: applying the Amoeba approach. *J. Aquatic Health*, 2: 277-286.

Lane, D.E. & Stephenson, R.L. 1997. Fisheries Management Science: integrating the roles of science, economics, sociology and politics into effective fisheries management. pp. 177-182. In D.A. Hancock, D.C. Smith, A. Grant & J.P. Beumer, eds. *Developing and Sustaining World Fisheries Resources: the State of Science and Management*, CSIRO, Collingwood, Australia, 797p.

Mangel, M, & 35 co-authors. 1996. Principles for conservation of wild living resources. *Ecol. Appl.,* 6: 338-362.

Marine Stewardship Council. 2002. *MSC principles and criteria for sustainable fishing*. London, Marine Stewardship Council. 6p.

McGoodwin, J. 1990. *Crisis in the World's fisheries: people problems and policies*. Stanford, Stanford Univ. Press. 235p.

Ostrom, E. 1990. *Governing the Commons. The Evolution of Institutions for Collective Action.* Cambridge University Press.

Pajak, P. 2000. Sustainability, ecosystem management, and indicators: thinking globally and acting locally in the 21st Century. *Fisheries,* 25(12): 16-30.

Pitcher, T.J. 1999. RAPFISH, a rapid appraisal technique for fisheries, and its application to the Code of Conduct for Responsible Fisheries. *FAO Fisheries Circular* No. 947, Rome, FAO. 52p.

Pitcher, T.J., Mackinson, S., Vasconcellos, M., Nøttestad, L. & Preikshot, D. 1999. Rapid appraisal of the status of fisheries for small pelagics using multivariate, multidisciplinary ordination, pp. 759-782. In T.J. Quinn II, F. Funk. J. Heifetz, J.N. Ianelli, J.E. Powers, J.F. Schweigert, P.J. Sullivan, C.-I. Zhang, eds. *Fishery Stock Assessment Models*. Alaska Sea Grant, Fairbanks.

Pitcher, T.J., Kalikoski, D. & Pramod, G. (eds). 2006. Evaluations of Compliance with the FAO (UN) Code of Conduct for Responsible Fisheries. *Fisheries Centre Research Reports* 14(2): 1191p.

Pomeroy, R.S., McConney, P. & Mahon, R. 2004. Comparative analysis of coastal resource co-management in the Caribbean. *Ocean & Coastal Management* 47: 429-447

Regier, H.A. 1992. Indicators of ecosystem integrity. In Mackenzie, D.H. D.E. Hyatt and V.J. McDonald, eds. pp. 183-200. *Ecological indicators*, Vol. 1, New York, Elsevier Applied Science.

Schiffman, S.S., Reynolds, M.L. & Young, F.W. 1981. *Introduction to multidimensional scaling: theory, methods and applications*, London, Academic Press.

Shotton, R. (ed.). 2000. Use of property rights in fisheries management. *FAO Fisheries Technical Papers*. 404/ (2 vols), Rome, FAO.

Stalans, L.J. 1995. Multidimensional scaling. In Grimm, L.G. & P.R. Yarnold, eds. *Reading and Understanding Multivariate Statistics*, Washington, American Psychological Association. 373p.

Ten Brink, B.J.E., Hoeper, S.H. & Colijn, F. 1991. A quantitative method for description and assessment of ecosystems: the AMOEBA approach. *Mar. Poll. Bull.,* 23: 265-70.

United Nations. 1995. 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. UN General Assembly, Doc. A/CONF.164/37, September 8, 1995, 36 pp.

United States of America National Marine Fisheries Service Ecosystem Principles Advisory Panel. 1999. *Ecosystem-based fishery management, a report to Congress*. NOAA, NMFS Washington D.C, 54 p.

Walters, C.J. 1998. Designing fisheries management systems that do not depend on accurate stock assessment, pp. 279-288. *In*: Pitcher, T.J. Hart, P.J.B. & Pauly, D. (eds) *Reinventing Fisheries Management*, Chapman & Hall, London.

Wefering, F.M., Danielson, L.E. & White, N.M. 2000. Using the AMOEBA approach to measure progress toward ecosystem sustainability within a shellfish restoration project in North Carolina. *Ecol. Modelling*, Vol 130(1-3), pp 157-166.

APPENDIX 1.

QUESTIONNAIRES ON CCRF ARTICLES 7 THROUGH 12[21]

[21] Based on those used at the 2005 World Wildlife Fund Mexico Gulf of California workshop.

Appendix 1A. Article 7: Fisheries Management

Note:

The Table below reproduces the questionnaires in Caddy (1996) with some editorial changes mainly designed to adapt some clauses that refer to international fisheries for use in a national fisheries context. (*Middle column items in italics provide context from Code statements to the questions, or relate to national/international fisheries responsibilities that were not used in the Gulf of California workshop, but could be added if this questionnaire were to be amplified for fisheries on straddling, shared or highly migratory resources. As noted, this would best be done by extending the questionnaire approach to the more detailed provisions of the 1995 United Nations Fish Stocks Agreement for high seas fisheries.)*

Scoring

Various scoring options are possible. For example, a scheme of 0 for No agreement, 0.5 for Uncertain or Partial agreement, and 1 for Yes or adequate agreement with the question can be applied.

Alternatively, the scoring could be 0 for No agreement, 1 for Uncertain or Partial agreement, and 2 for Yes for adequate agreement with the question. Under this scheme, if the original statements for Article 7 in the Code are given an equal score, excluding statements in italics, this corresponds to 40 questions, and a maximum score of 80 for full compliance.

If it is decided to score each question generated by Article 7 equally, answers to multiple questions generated by one Code statement would be reduced in value (e.g. if three questions are generated by a single Code statement, use 0 for No agreement, 1/3 for Uncertain or Partial, and 2/3 for adequate agreement) This should also give the same maximum score of 80 for full compliance.

Article 7: Fisheries Management		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
General		
7.1.1 a	Are conservation and management measures based on the best scientific evidence available?	
7.1.1 b	Are management measures in effect designed to ensure the long term sustainability of resources?	
7.1.2 a	Have attempts been made to identify domestic parties having a legitimate interest in the use and management of fisheries resources?	
7.1.2 b	Have arrangements been made to consult these parties and gain their collaboration?	
7.1.3	*Cooperation with other States exploiting transboundary stocks?*	
7.1.4	*Membership and cooperation of States fishing a resource within an Inernational fisheries organization or arrangement?*	
7.1.5	*Cooperation of non-member States with an International fisheries Organization?*	
7.1.6 a	Are there regular meetings of relevant governmental and non-governmental organizations to discuss fisheries?	
7.1.6 b	Are interested parties given the opportunity to attend meetings as participants or as observers?	
7.1.6 c	Subject to rules of access, are interested parties given access to the records or reports of such meetings?	

Article 7: Fisheries Management		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
7.1.7	Are fisheries monitoring, control and surveillance provisions adequate and effective to ensure compliance with management measures?	
7.1.8 a	Have mechanisms been established to identify, prevent, quantify, and eliminate, excess fishing capacity?	
7.1.8 b	Have these measures proved effective?	
7.1.9	Is there transparency in a) assessments, b) decision-making on management measures?	
7.1.10 a	Are conservation and management measures and their rationale disseminated effectively?	
7.1.10 b	Is the basis and purpose of such regulations explained to users?	
7.2 Management objectives		
7.2.1 a	Are fishery measures qualified by environmental and economic factors?	
7.2.1 b	Have formal reference points based on stock size been established?	
7.2.1 c	Are measures in place designed to maintain or restore stocks to levels capable of producing MSY?	
7.2.1 d	Are the special requirements of developing countries being taken into account?	
7.2.2 a	Is excess fleet capacity avoided?	
7.2.2 b	Do the economic conditions under which the fishery operates promote responsible fishing?	
7.2.2 c	Do management measures in place ensure protection of the interests of the small scale, artisanal and subsistence fishers?	
7.2.2 d	Is biodiversity being conserved?	
7.2.2 e	Have depleted stocks been allowed to recover?	
7.2.2 f	Have adverse impacts of human activities on the resource been identified and minimized?	
7.2.2 g	Have pollution and waste been minimized?	
7.2.2 h	Has catch (commercial and non-commercial) by lost and abandoned gear been minimized?	
7.2.2 i	Have selective and environmentally-safe and cost-effective fishing methods been developed?	
7.2.3	Have the impacts of environmental factors on the target stocks and associated species in the same ecosystem been assessed?	
7.3 Management framework and procedures		
7.3.1	Has the stock area been mapped and have management measures taken into account the whole stock unit over its entire distributional area?	
7.3.2	*Compatibility of national management measures for transboundary stocks*	
7.3.3	Have previously-agreed long-term management measures been translated into management actions within a management plan or other management framework?	
7.3.4	Have attempts been made to foster cooperation by all interested parties in (a) information gathering, (b) research, (c) management, (d) fisheries development? *(This item which refers to cooperation between States is modified for local fisheries)*	(Optionally scored as 4 questions?)
7.3.5	*Consultation with other parties prior to State action through a non-fishery Organization which affects fishery conservation measures*	
7.4 Data gathering and management advice		
7.4.1	*Repeated injunction in 7.1.1 to use best scientific advice in evaluating state of resources and impacts of proposed measures.*	
7.4.2 a	Has relevant research been carried out on the resource?	
7.4.2 b	Has relevant research been carried out on the effects of climatic and environmental factors affecting the fishery?	
7.4.2 c	Has relevant research been carried out on socio-economic factors affecting the fishery?	

Article 7: Fisheries Management		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
7.4.3	Have studies been promoted on the costs, benefits, and effects of alternative management options for rationalizing fishing, especially relating to excessive capacity and fishing effort?	
7.4.4 a	Are timely and reliable statistics, meeting international standards, available on catch and fishing effort, so as to allow sound statistical analysis?	
7.4.4 b	Is statistical data maintained in accordance with international standards, and updated and verified regularly?	
7.4.4 c	Is statistical data compiled and disseminated regularly, and consistent with any applicable confidentiality requirements?	
7.4.5	Is sufficient information being gathered by relevant research on social, economic and institutional factors, and is it being analysed?	
7.4.6	*Originally relating to States' duty to provide fishery data to regional organizations; modified to:* Do participants in fisheries have a responsibility to provide data on their operations to fisheries management?	
7.4.7	*Originally relating to regional organizations' duty to compile fishery data; modified to:* Do management authorities compile fisheries data and make it available to interested parties in a timely manner?	
7.5 Precautionary approach		
7.5.1	Has the management authority avoided using the absence of data as a reason for postponing conservation/management measures?	
7.5.2 a	*(In establishing management measures):* Have uncertainties as to the established reference points for size, productivity, and condition of stocks, been taken into account by the fishery management authority?	
7.5.2 b	*(In establishing management measures),* Has the management authority taken into account uncertainties relative to the fishing mortality exerted, and environmental and socio-economic conditions?	
7.5.2 c	*(In establishing management measures),* has the impact of fishing activities on discards or non-target, associated, or dependent species been taken into account?	
7.5.3 a	Have safe target reference points for fisheries been established, and the actions to take if they are exceeded?	
7.5.3 b	Have safe stock-specific limit reference points for fisheries been established and the actions to take to ensure they will not be exceeded?	
7.5.4	In the case of a new fishery or a new exploitation method, have provisions been made for their gradual introduction and subsequent development, by establishing cautious conservation measures while sufficient data are collected to evaluate the impact of the new fishery?	
7.5.5	Have contingency plans been drawn up to introduce temporary management measures, ensuring that fishing activity does not exacerbate serious threats to the resource caused by natural phenomena?	
7.6 Management measures		
7.6.1	Have management mechanisms been established to ensure that the level of fishing permitted is commensurate with the state of resources?	
7.6.2	Have measures been adopted to prevent fishing vessels from operating on the resource without specific authorization?	
7.6.3 a	Where excess capacity exists, have mechanisms been established to reduce fishing capacity to levels consistent with sustainable use of the resource?	
7.6.3 b	Are mechanisms in place to evaluate and monitor the effective capacity of fishing fleets so that the fishery operates under economic conditions that promote responsible fishing?	
7.6.4 a	Is the performance of existing fishing gear and practices kept under review?	

Article 7: Fisheries Management		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
7.6.4 b	*Taking into account the impact of such management measures on the ability of fishing communities to exploit the resource;* Are fishing gear, methods and practices which are inconsistent with responsible fisheries, phased out and replaced by acceptable alternatives?	
7.6.5	Is the fishery managed in such a way that conflict is minimized between different users, different vessels, gear and fishing methods?	
7.6.6	Has the management of fishery resources taken into account traditional practices and interests of indigenous peoples, and those local communities highly dependent on the resource for their livelihood?	
7.6.7	Have the cost-effectiveness and social impact of alternative conservation measures been taken into account?	
7.6.8	Are procedures in place to review the efficiency of current conservation and management measures?	
7.6.9 a	Are appropriate measures (*) in place to reduce waste, discards, catches of non-target and associated or endangered species affected by the fishery? *(*Technical measures such as fish size, mesh size, discards, closed seasons, closed seasons and areas, and areas reserved for selected or artisanal fisheries are referred to here).*	
7.6.9 b	Are measures, as appropriate, applied to the protection of juveniles or spawners?	
7.6.9 c	To the extent practicable, is the development and use of selective, environmentally-safe and cost effective gear and techniques promoted?	
7.6.10 a	Have depleted species, or those threatened with depletion, been identified, protected, and their recovery facilitated?	
7.6.10 b	*Where resources and habitats critical to the well-being of a fished resource have been adversely affected by exploitation;* Has an effort been made to ensure that essential habitats and biological requirements of harvested species are restored?	
7.7 Implementation		
7.7.1	Is an effective legal and administrative framework in place at the national or local level to ensure conservation and management of fisheries resources?	
7.7.2	Are sanctions applicable in the case of violations to laws and regulations adequate in severity to be effective? *(including sanctions that allow for the withdrawal or suspension of authorizations to fish)*	
7.7.3	Are there in place: (a) Effective MCS programmes? (b) Observer programmes? (c) Inspection schemes? (d) Vessel monitoring schemes?	Optionally scored as 4 questions?
7.7.4 a	Have fisheries management organizations agreed on the means whereby the necessary functions for fishery management will be financed?	
7.7.4 b	Can management cost recovery measures be implemented for the fishery?	
7.7.5	Have measures been taken to prevent access to the resource by those not authorized to fish?	
7.8 Financial Institutions		
7.8.1	*Requirement that banks not provide loans to reflagged vessels in jurisdictions other than that of the State of beneficial ownership.*	

Appendix 1B. Article 8: Fishing Operations

Note:

The table below (partially based on Caddy, 1996), provides a reformulation of issues related to fisheries operations in national waters. Suggested scoring options are the same as for Article 7. *(Issues coming under national jurisdiction and in international waters are indicated in italics, and may be omitted where local fisheries management authorities are concerned.)*

Article 8: Fishing Operations		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
8.1 Duties of all States		
8.1.2	Is the local management body *(Replaces "State" in all the following)* maintaining an updated record of all authorizations to fish?	
8.1.3	Is the management body maintaining and updating regularly, statistical data on all fishing operations allowed by them?	
8.1.4	Within a regional framework involving other regional bodies, is the local management body cooperating in establishing systems for monitoring, control and surveillance and enforcement of measures regulating fishing operations?	
8.1.5	Is adherence to established health and safety standards being enforced by the local management body?	
8.1.6	Is the management body working with appropriate national or international organizations to integrate fishing operations into maritime search and rescue systems?	
8.1.7	Are education and training programmes for fishers being implemented that meet international standards and guidelines?	
8.1.8	Are records being kept of certifications of competency of fishermen?	
8.1.9	Do control measures envisage the withdrawal or suspension of the right to fish for officials of fishing vessels found guilty of offences relating to negligent vessel operation?	
8.1.10	Are education and training measures making fishers aware of the provisions of this Code and other applicable environmental and other standards essential for a responsible fishery?	
8.2 Flag State duties		
8.2.3	*Are national vessels licensed to fish on the high seas appropriately marked for identification by non-national authorities, with details on board of the vessels, their ownership, and authorisation to fish?*	
8.2.4	*Is there national legislation requiring fishing gear to be marked so that the owner can be identified?*	
8.2.5	*Does an appropriate management body ensure compliance with appropriate safety requirements for fishing vessels and fishers in accordance with* international conventions, codes of practice or voluntary guidelines?	
8.2.7	Are sanctions (such as suspension, withdrawal or refusal of an authorization to fish) for any violation of regulations, adequate in severity to secure compliance and discourage violations?	
8.3 Port State Duties *(Not applicable at below national level)*		
8.4 Fishery regulations		
8.4.1a	Do management bodies ensure that fishing is conducted with due regard to established standards for the safety of human life?	
8.4.1b	Are established standards related to: (i) the organization of marine traffic (ii) protection of the marine environment (iii) the prevention of damage to, or loss of fishing gear adhered to?	

Article 8: Fishing Operations		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
8.4.2	Have destructive fishing operations (e.g. dynamiting, poisoning) been prohibited in legislation?	
8.4.3	Is documentation required on board fishing vessels detailing: (i) allowed fishing operations, (ii) retention of fish catch (iii) retention of other species subject to conservation measures?	
8.4.4	Is the use of the appropriate technology for best care and retention of the catch being promoted?	
8.4.5	Are technologies, material and operational methods being promoted and applied to reduce discards?	
8.4.6	Are technologies, material and operational methods being promoted and applied to minimize the loss of fishing gear and ghost fishing by lost or abandoned gear?	
8.4.7	Are the implications of the commercial scale introduction of a new gear or fishing operation on the fish habitat, considered prior to its introduction?	
8.4.8	Is research being promoted on the environmental and social impacts of fishing gear and its impacts on biodiversity and coastal fishing communities?	
8.5 Fishing gear selectivity		
8.5.1a	Do management authorities require fishing gear, methods and practices to be as far as possible, selective, so as to minimize (i) waste, (ii) discards and (iii) catches of non-target species?	
8.5.1b	Have fishers cooperated in the development of selective fishing gear and methods?	
8.5.1c	Have management authorities ensured that information on new developments and requirements is made available to all fishers?	
8.5.2	When drawing up laws and regulations, have fisheries authorities taken into account the range of selective fishing gears and methods available to the industry?	
8.5.3	Have standard methodologies for studies on fishing gear selectivity and methods been decided by those organizations concerned?	
8.5.4a	Has there been collaboration between national and international bodies concerned with such studies?	
8.5.4b	Have there been efforts to: (i) disseminate the results of such research programmes? (ii) ensure that a transfer of technologies occurs?	
8.6 Energy optimization		
8.6.1	Have appropriate standards and guidelines been developed and promoted leading to more efficient use of energy in (i) harvesting and (ii) post-harvest activities within the fisheries sector?	
8.6.2	Have owners, charterers and managers of fishing vessels been encouraged to fit their vessels with energy optimisation devices?	
8.7 Protection of the aquatic environment		
8.7.1	Have management authorities introduced and enforced laws and regulations based on the 1978 Protocol of MARPOL 73/78? *(See Code for details)*	
8.7.2	Is appropriate equipment fitted to fishing vessels as required by MARPOL 73/78, such as shipboard compactors or incinerators to treat waste generated during a vessel's normal service?	

Article 8: Fishing Operations		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
8.7.3	Are owners, charterers and managers of fishing vessels encouraged to minimize the taking aboard of potential garbage by following appropriate provisioning practices?	
8.7.4	Are proper shipboard procedures taught to crew members to ensure garbage discharges do not exceed levels specified by MARPOL, including disposal of oily waste and storage of shipboard garbage?	
8.8 Protection of the atmosphere		
8.8.1	Have relevant standards and guidelines been adopted by the authorities which require reduction of dangerous substances in exhaust gas emissions?	
8.8.2	Have owners, charterers and managers of fishing vessels ensured that their vessels are fitted with equipment to reduce emissions of ozone-depleting substances, and that responsible crew members are conversant with the proper running of machinery on board?	
8.8.3	Have authorities made provisions for (i) the phasing out of the use of chlorofluorocarbons (CFCs) and transitional substances such as hydrochlorofluorocarbons (HCFCs) in the refrigeration systems of fishing vessels, and that (ii) those engaged in the fishing industry are informed of and comply with such provisions?	
8.8.4a	Have owners or managers of fishing vessels taken appropriate action to refit existing vessels with alternative refrigerants to CFCs and HCFCs, and to use alternatives to Halons in fire fighting installations?	
8.8.4b	Are such provisions required in specifications of all new fishing vessels?	
8.8.5	Are international guidelines followed for disposal of CFCs, HCFCs and Halons?	
8.9 Harbours and landing places for fishing vessels		
8.9.1	Do management authorities take into account the following in the design and construction of harbours and landing places? (i) Provision of safe havens (ii) Adequate servicing facilities for vessels, vendors and buyers? (iii) Adequate freshwater supplies? (iv) Adequate sanitation arrangements? (v) Disposal systems for oil, oily water, and fishing gear?	
8.9.2	Are authorities responsible for coastal area management consulted on the selection or improvement of sites for fishing vessel harbours?	
8.10 Abandonment of structures and other materials		
8.10.1	(i) Are standards and guidelines for removal of redundant offshore structures issued by the IMO being followed? (ii) Are competent fisheries authorities consulted before such structures are abandoned?	
8.11 Artificial reefs and fish aggregation devices (FADS)		
8.11.1a	Have policies been developed for increasing stock populations and enhancing fishing opportunities using artificial structures placed on or above the sea floor or at the surface?	
8.11.1b	Has proper placement of these structures taken into account possible hazards to navigation?	
8.11.1c	Has research on their impact on living marine resources and the environment been promoted?	

Article 8: Fishing Operations		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
8.11.2	Has care been taken (i) in the selection of materials to use in constructing artificial reefs? (ii) in the selection of sites for their deployment? (iii) to ensure that relevant conventions concerning the environment and the safety of navigation have been observed?	
8.11.3a	Have management plans for artificial reefs or FADs been included within the framework of coastal area management plans?	
8.11.3b	Have such plans taken into account the interests of fishers; including artisanal and subsistence fishers?	
8.11.4	Have authorities responsible for maintaining cartographic records or charts for navigation, and relevant environmental authorities, been informed prior to placement or removal of artificial reefs or FADs?	

Appendix 1C. Article 9: Aquaculture Development

Note:

The table below is mainly based on Article 9 of the Code, but also draws upon the *FAO Technical Guidelines for Aquaculture Development* for additional specifications. Suggested scoring options are the same as for Article 7.

Article 9: Aquaculture Development		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
9.1 Responsible development of aquaculture, including culture-based fisheries		
9.1.1a	Is an appropriate legal and administrative framework in place which facilitates the development of responsible aquaculture?	
9.1.1b	(i) Have norms and standards for aquaculture farm operation been drawn up? (ii) Are norms and standards diffused to farmers? (iii) Are there regulations for site location of aquaculture facilities?	
9.1.2	Are the effects of aquaculture on genetic diversity and ecosystem integrity being evaluated scientifically?	
9.1.3a	Has a study of the aquaculture potential of the region been carried out?	
9.1.3b	Has the study concluded that aquaculture is ecologically sustainable in that locality and allows the rational sharing of resources with other activities?	
9.1.3c	Has a national, sub-regional, or local plan for aquaculture development containing strategies and plans been drawn up?	
9.1.3d	Has the plan been explained to farmers?	
9.1.3e	Is there a regional plan for land/water use in place?	
9.1.3f	Is a water or river basin use plan in place?	
9.1.3g	Does this involve zonation of areas for aquaculture?	
9.1.3h	(i) Is there a water allocation policy in place? (ii) Is a water pricing policy in effect?	
9.1.3i	Has there been an attempt to establish links between aquaculture and the farming sector?	
9.1.4a	Have the rural poor been helped with advice or demonstration projects to enter the small-scale aquaculture sector?	
9.1.4b	Is care taken that aquaculture does not affect critical habitats for wild fisheries?	
9.1.4c	Do aquaculture facilities employ fishers who are surplus to, or displaced from fisheries?	
9.1.5a	Have norms and standards been established on: (i) Land use for aquaculture? (ii) Product quality? (iii) Disposal of waste water and effluents? (iv) Avoidance of dispersal of chemicals/drugs in the local environment?	
9.1.5b	Are there procedures in place for environmental assessment and monitoring so as to minimize adverse ecological and related economic and social changes from aquaculture?	
9.1.5c	Has there been a study of the possible negative impacts of aquaculture on other uses of water resources, especially in areas subject to water shortage?	

Article 9: Aquaculture Development		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
9.2 Responsible development of aquaculture, including culture-based fisheries within transboundary ecosystems		
9.2.1	Are regulations in place in accord with international norms?	
9.2.2	Is a responsible choice of species, sites and management procedures being promoted in line with international law, where this could affect transboundary aquatic systems?	
9.2.3a	Has the State consulted with adjacent jurisdictions before introducing exotic species?	
9.2.3b	Is there a body that reviews proposals relating to aquaculture development or transfer of exotics and broodstock?	
9.2.4	(i) Is there a regional database on aquaculture enterprises with their species and characteristics? (ii) Is this database available to the public?	
9.2.5	Is international or other cross boundary cooperation being encouraged in the use of aquaculture procedures where these may affect conservation of transboundary aquatic systems?	
9.3 Use of aquatic genetic resources for purposes of aquaculture, including culture-based fisheries		
9.3.1a	Are efforts being made to minimize the harmful effects of introducing non-native species or genetically altered stocks?	
9.3.1b	Has care been taken to avoid escape of exotic species from aquafarms?	
9.3.1c	Are exotic species distributions monitored after escape from farms?	
9.3.2	Are international codes of practice for introduction or transfers of aquatic organisms being observed?	
9.3.3a	Are there regulations on introduction of exotic species?	
9.3.3b	Is care taken to avoid movement of genotypes or species between catchment areas or river/lake systems?	
9.3.3c	Is care taken to avoid contamination of local wild genoptypes from farm animals of the same species?	
9.3.3d	Do quarantine facilities exist on farms?	
9.3.4a	Are appropriate procedures being published for the selection of broodstock, eggs, larvae and fry?	
9.3.4b	Is training in responsible aquaculture methodologies available?	
9.3.5a	Is research into aquaculture and culture techniques being promoted?	
9.3.5b	Is research into rehabilitation techniques for endangered species and the conservation of genetic diversity, being promoted?	
9.4 Responsible aquaculture at the production level		
9.4.1a	Has a (national, regional, local) authority been designated to promote responsible aquaculture development?	
9.4.1b	Has the awareness of the public and consumers been raised as to the benefits of aquaculture development?	
9.4.2a	Are aquaculture associations in place?	
9.4.2b	Are responsible aquaculture approaches being implemented through self-help aquafarmer groups and producer organizations?	
9.4.2c	Has collaboration of aquaculture farmers been sought in establishing codes of practice?	
9.4.3	Are efforts being made to improve selection and use of appropriate (i) feeds? (ii) feed additives? (iii) fertilizers, including manures?	

Article 9: Aquaculture Development		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
9.4.4a	Are stock densities realistic, and kept in check to reduce risk of disease?	
9.4.4b	Are hygienic measures and vaccines routinely used?	
9.4.4c	Is safe and minimum use of therapeutants, hormones, drugs, antibiotics and other disease control chemicals being promoted?	
9.4.4d	Are appropriate norms against disease spread applied?	
9.4.5	Is the use of drugs, antibiotics, hormones or other potentially hazardous chemicals inputs regulated?	
9.4.6	Has an environmental evaluation been carried out on existing aquaculture facilities to determine human health and environmental hazard levels associated with waste disposal and chemical inputs?	
9.4.7	Are measures being taken to promote food safety of aquaculture products (i) during harvesting? (ii) during on-site processing? (iii) in storage and transport?	

Appendix 1D. Article 10: Integration of Fisheries into Coastal Area Management

Note:

See also the co-management questionnaire in Appendix 2B; a degree of overlap evidently exists – one comment is that Article 10 of the Code does not enter into indigenous rights, which are important in some countries. Suggested scoring options are the same as for Article 7.

Article 10: Integration of Fisheries into Coastal Area Management		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
10.1 Institutional framework		
10.1.1a	Has an appropriate framework for (i) policies (ii) legal issues (iii) institutions been adopted to achieve sustainable use of resources?	
10.1.1b	Does this framework take into account: (i) the fragility of coastal ecosystems; (ii) the finite nature of coastal resources; (iii) the needs of coastal communities?	
10.1.2	Have provisions been made for the fisheries sector and fishing communities to be consulted on decisions involving coastal area development and management planning?	
10.1.3a	Have institutional and legal frameworks been developed and have the possible uses of coastal resources been determined?	
10.1.3b	Has access to these resources been decided taking into account (i) the rights of coastal communities? (ii) their customary practices, to the extent compatible with sustainable development?	
10.1.4a	Have practices which reduce conflict between fishery resource users been adopted?	
10.1.4b	Have practices which reduce conflict between fishers and other users of the coastal area been adopted?	
10.1.5	Have measures and mechanisms been adopted to settle conflicts which arise within the fisheries sector and between fishery resource users and other users of the coastal area?	
10.2 Policy measures		
10.2.1a	Have attempts been made to create public awareness of the need for protection and management of coastal resources?	
10.2.1b	Have those affected by the management process been made aware of its provisions?	
10.2.2	Has an attempt been made to assist decision-making on the allocation and use of coastal resources, by assessing their respective value, taking into account: (i) economic, (ii) social and (iii) cultural factors?	
10.2.3	Has due account been taken of the risks and uncertainties involved in setting policies for the management of coastal areas?	

Article 10: Integration of Fisheries into Coastal Area Management		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
10.2.4	Have systems of monitoring the coastal environment been established that take into account (i) physical, (ii) chemical, (iii) biological, (iv) economic, (v) social, (vi) legal, and (vii) institutional aspects?	
10.2.5	Has multidisciplinary research in support of coastal area management been supported, taking into account: (i) physical, (ii) chemical, (iii) biological, (iv) economic, (v) social, (vi) legal, and (vii) institutional aspects?	
10.3 Regional cooperation		
10.3.1	Have efforts been made to cooperate with adjacent jurisdictions in facilitating sustainable use of: (i) coastal resources? (ii) the conservation of the environment?	
10.3.2	In the case of activities with an adverse effect on adjacent jurisdictions, do authorities provide timely information and if possible prior notification?	
10.3.3	Do authorities consult with adjacent jurisdictions in order to improve coastal area management?	
10.4 Implementation		
10.4.1	Are mechanisms in place to facilitate cooperation between authorities in adjacent jurisdictions in the planning, development, conservation and management of coastal areas?	
10.4.2	Do the authorities representing the fisheries sector in the coastal management process have access to the appropriate (i) technical capacities? (ii) financial resources?	

Appendix 1E. Article 11: Post-harvest Practices and Trade

Note:

A questionnaire for Post-harvest Practices and Trade is included here for completeness, although it deals principally with State responsibilities. These issues are currently being considered during the WTO round of negotiations as they relate to fisheries and fish products. Selected original Article 11 statements directed towards States ("States should...") have been modified insofar as possible to apply to local or subregional authorities in the questionnaire presented here. Suggested scoring options are the same as for Article 7.

Article 11: Post-harvest Practices and Trade		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
11.1 Responsible fish utilization		
11.1.1	Have the relevant authorities adopted appropriate measures to ensure the rights of consumers to safe, wholesome and unadulterated fishery products?	
11.1.2	Have the relevant authorities established and maintained effective safety and quality assurance systems to protect consumer health and prevent commercial fraud?	
11.1.3a	Have the relevant authorities set minimum standards for safety and quality assurance?	
11.1.3b	Have the relevant authorities made sure that these standards are effectively applied throughout the industry?	
11.1.4	Is there cooperation between authorities and agencies in adjacent jurisdictions to (i) achieve harmonization, or mutual recognition, of sanitary measures and certification programmes, and (ii) explore the possibility of mutually recognized control and certification agencies?	
11.1.5	Has due consideration been given to the economic and social role of the post-harvest fisheries sector when formulating policies for sustainable development and utilization of fishery resources?	
11.1.6	Are the relevant authorities and organizations sponsoring research in fish technology and quality assurance and supporting projects to improve post-harvest handling of fish and fish products?	
11.1.7	Are the relevant authorities cooperating to facilitate the development and transfer of appropriate technologies, and ensuring that processing, transport and storage methods are environmentally sound?	
11.1.8a	Are the relevant authorities encouraging those involved in fish processing, distribution and marketing to reduce post-harvest losses and waste?	
11.1.8b	Are the relevant authorities encouraging those involved in fish processing, distribution and marketing to improve the use of by catch?	
11.1.8c	Are the relevant authorities encouraging those involved in fish processing, distribution and marketing to use resources such as fresh water, energy and wood in an environmentally sound manner?	
11.1.9	Are the relevant authorities encouraging the use of fish for human consumption, and promoting the consumption of fish?	
11.1.10	Are the relevant authorities cooperating to promote the production of value-added products?	
11.1.11	Are the relevant authorities ensuring that trade in fish and fish products accords with sound conservation and management practices by improving the identification of the origin of the product? (i.e. are eco-labelling practices being followed?)	

Article 11: Post-harvest Practices and Trade		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
11.1.12	Are the environmental effects of post-harvest activities taken into account when developing fisheries laws, regulations and policies?	
11.2 Responsible international trade [Note: This section not adapted for inclusion in present questionnaire.]		
11.3 Laws and regulations relating to fish trade		
11.3.2	Do the authorities facilitate appropriate consultation with, and participation of industry as well as environmental and consumer groups in the development of laws and regulations?	
11.3.3	Have the authorities simplified its laws, regulations and administrative procedures applicable to fisheries?	
11.3.4	Do the authorities allow sufficient time after introducing a new law for changes to be made to operating procedures without undue expenses to participants in the fishery?	
11.3.5	Do the authorities periodically review laws and regulations affecting the fishery in order to determine if the conditions that led to their introduction still exist?	
11.3.8	Do the authorities promptly notify interested parties on changes to laws, regulations and administrative procedures, and the dates when they will come into effect?	

Appendix 1F. Article 12: Fisheries Research

Note:

Suggested scoring options are the same as for Article 7).

Article 12: Fisheries Research		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
12.1a	Is there a sound scientific basis available for providing research advice to fishery managers and other interested parties?	
12.1b	Is appropriate research being conducted into: (i) biology?, (ii) ecology? (iii) technology? (iv) environmental science? (v) economics? (vi) social science? (vii) aquaculture? (viii) nutritional science?	
12.1c	Are adequate research facilities available?	
12.1d	Is there appropriate training available nationally in fishery-related subjects?	
12.1e	Is the staffing of these institutes appropriate to provide for the needs of fisheries advice?	
12.1f	Is the institutional structure of national research facilities appropriate for providing such advice?	
12.2	Is there an appropriate institutional framework to determine applied research needs and use?	
12.3a	Are the data generated by research being analysed?	
12.3b	Are the results of research being published?	
12.3c	Is confidentiality of data, where appropriate, being respected?	
12.3d	Are the means available for distributing/disseminating research advice where appropriate?	
12.3e	Is the advice provided in a timely fashion?	
12.3f	Is the advice presented in a form that is readily understood (by lay persons)?	
12.3g	Is appropriate new research initiated as soon as possible once a need is evident for advice in this area?	
12.4a	Is reliable and accurate data being collected as required to assess the status of fisheries and ecosystems?	
12.4b	Are data being collected on (i) bycatch? (ii) discards? (iii) waste?	
12.4c	Are data being provided at an appropriate level of aggregation to the appropriate institutions?	

Article 12: Fisheries Research		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
12.5a	Is the relevant authority able to monitor and assess the state of resources under its jurisdiction?	
12.5b	Are impacts being assessed of: (i) fishing pressure? (ii) pollution? (iii) habitat alteration?	
12.5c	Is the capacity available to assess the effect of climate (i) or other environmental changes on fish stocks (ii) and aquatic ecosystems (iii)	
12.6	Do national research capabilities meet acknowledged scientific standards? *(Suggested criterion: publications in internationally acknowledged fishery journals.)*	
12.7a	Is there cooperation with relevant international organizations?	
12.7b	Is research being encouraged to ensure optimum utilization of fishery resources?	
12.7c	Is the research being carried out adequate to support national policies related to fish as food?	
12.8a	Is research being carried out into or is there monitoring/surveys of human food supplies from aquatic sources?	
12.8b	On the basis of such research, are steps taken to ensure that there are no adverse health impacts from aquatic products on consumers?	
12.8c	Are the results of such research being made publicly available?	
12.9a	Is there adequate research on the (i) economic (ii) social (iii) marketing and (iv) institutional aspects of fisheries?	
12.9b	Are comparable data being generated for ongoing (i) monitoring? (ii) analysis? (iii) policy formulation?	
12.10a	Is research carried out on: (i) the selectivity of fishing gear? (ii) the environmental impact of such gear on target species?	
12.10b	Is an effort made to minimize non-utilized catches?	
12.10c	Is an effort made to safeguard the biodiversity of ecosystems?	
12.10d	Is an effort made to safeguard the aquatic habitat?	
12.11a	Is a scientific evaluation undertaken of the impact of new types of gear on the fisheries and ecosystems prior to introduction being authorized?	
12.11b	Are the effects of such gear introductions monitored subsequently?	
12.12a	Is there an effort to investigate and document traditional fisheries knowledge and technologies, particularly for small scale fisheries?	

Article 12: Fisheries Research		
Article paragraph/ clause	**Question:**	**Scoring (comments)**
12.12b	Is the potential application of such knowledge to sustainable fisheries conservation, management and development assessed?	
12.13a	Do the authorities promote the use of research results as a basis for setting management objectives?	
12.13b	Have the authorities established fisheries management objectives?	
12.13c	Have the authorities established reference points for fishery management?	
12.13d	d) Have the authorities established performance criteria for (i) fishery research? (ii) fishery management?	
12.13e	Have adequate (institutional) linkages been established between research and fishery management?	

APPENDIX 2.

QUESTIONNAIRES ON ECOSYSTEM APPROACH AND COMMUNITY-BASED MANAGEMENT

Appendix 2A. Ecosystem Principles

Note:

Extracts from the sources cited below are used as inputs to a possible framework of principles for ecosystem management of fisheries that can be modified to suit local or national priorities.

1) Alverson (2004):

The literature on ecosystem management was reviewed, including the results of a questionnaire sent to top experts in the field. From this, the author drew several conclusions:

(a) ecosystem management is a current high priority for many scientists and fisheries managers;

(b) despite this, many people are confused by the terminology used in describing this objective;

(c) principles of ecosystem management are rarely translated into operationally-meaningful terms;

(d) doing so will require that managers place values on ecosystems and their components, and specify what goods and services are to be expected from the ecosystem;

(e) the net result of applications of ecosystem management to date has been to emphasize current uncertainty in trends and processes and the need for the precautionary approach;

(f) most solutions expressed to date involve trophic calculations, and the responses focus mainly on changes to the amount and spatial allocation of fishing effort on resources, rather than dealing with human impacts on habitats.

2) Holt and Talbot (1978):

(a) A desirable ecosystem state is one where consumptive and non-consumptive values can be maximized on a continuing basis.

(b) Present and future options and uses of the ecosystem must be ensured, and the risk of irreversible changes minimized.

(c) Management measures should include a safety factor to allow for imperfect information and inefficient institutions.

(d) Conservation measures should avoid wasteful use of non-target resources.

(e) Surveys and assessments should precede and accompany use of wild resources, and should be available for critical public view.

3) Mangel *et al.* (1996):

(a) Maintenance of healthy populations of wild resources is incompatible with unlimited human consumption and demand for the same resources.

(b) Resources and ecosystems should not be perturbed beyond natural boundaries of variation, whether at the genetic, species, population or ecosystem levels.

(c) Regulations should be based on an understanding of the structure and dynamics of the ecosystem, and take into account economic and social effects of resource use and the interests, motives and values of stakeholders.

(d) The full range of skills from natural and social sciences must be brought to bear on conservation problems.

(e) Effective conservation requires interactive and continuous communication between the interested parties involved.

4) The Marine Stewardship Council (MSC)

(a) A fishery should be conducted in a manner that does not lead to depletion, but if depleted, the fishery should be conducted in a manner that leads to its recovery.

(b) Fishery operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem.

(c) The fishery should be managed in a way that is effective, and takes into account local, national and international laws and standards.

(d) Operational and institutional frameworks should require use of the resource to be responsible and sustainable.

5) The US NMFS Ecosystem Principles Advisory Panel (1999)

(a) The ability to predict ecosystem behaviour is limited.

(b) Ecosystems have real thresholds and limits that when exceeded, can effect major system restructuring.

(c) Once thresholds and limits have been exceeded, changes can be irreversible.

(d) Diversity is important for ecosystem functioning.

(e) Multiple scales operate within and among ecosystems.

(f) Components of ecosystems are linked.

(g) Ecosystem boundaries are open.

(h) Ecosystems change with time.

Not all of the above sets of principles will be easy to express in the form of a questionnaire, nor in all cases are these statements easily rendered operational. Perhaps they could be regarded as useful debating points when searching for general principles to underlie the activities of ecosystem managers?

Independently of the above principles, the questionnaire below provides coverage of issues related to the ecosystem approach to fisheries, based largely on FAO Technical Guidelines on Responsible Fisheries No. 4: “The ecosystem approach to fisheries management”. It can be noted that, as for other questionnaires presented here, overlaps occur – especially in this case with issues related to co-management and integrated coastal area management (ICAM). This appears to be inevitable, and is not a problem if the questionnaires are used separately, or if the overlap is seen as a form of weighting to reinforce important considerations.

Draft Questionnaire: Application of the Ecosystem Approach to Fisheries

Note:

Suggested scoring options are the same as for Article 7.

Application of the Ecosystem Approach to Fisheries		
Item No.	**Question:**	**Scoring (comments)**
1	Has an attempt been made to identify all resources in the region of interest to fishers and the public?	
2	Have broad social, economic and ecological issues regarding the fauna/flora of the area been taken into account?	
3	Have international, national and sub-regional policy goals for the area been considered?	
4	Have broad policy objectives for the ecosystem been (i) defined? (ii) taken into account?	
5	Has a food web been drawn up for the fauna/flora of the area?	
6	Are life histories of fauna in the area known or documented?	
7a	Is there knowledge of: (i) stock areas? (ii) areas of seasonal distributions? (iii) distributions of different life history stages?	
7b	Are these geographical data sets available on a GIS format?	
8	Are the seasonal areas of human activities or impacts from fishing known with regard to: (i) pollution? (ii) coastal development? (iii) recreational activities? (iv) sewage or other at-sea disposal activities?	
9a	Is discarding at sea of litter and gear a problem?	
9b	Is ghost fishing by discarded gear a problem?	
9c	Are campaigns held periodically to recover discarded gear?	
9d	Do fish plants discard into the sea offal and other materials?	
10a	Are catches of the principal harvested species known?	
10b	Are catches and discards of juveniles of commercial species known?	
10c	Are discards of non-commercial species known?	
10d	Are catches of charismatic or protected species known?	
11a	Are territorial user rights being respected by fishers, communities or cooperatives?	

Application of the Ecosystem Approach to Fisheries		
Item No.	**Question:**	**Scoring (comments)**
11b	Do fishing licences restrict access to particular grounds in the area?	
12	Is it known which species consume discards and what would be the impact of discarding or not on their populations?	
13a	a) Are critical life history stages known?	
13b	b) Are migrations known?	
13c	c) Are bottlenecks in the life history due to habitat characteristics of the region known?	
14	Have the effects of existing management measures on the fauna of the area been identified?	
15a	For principal fishing gear, has there been documentation of their: (i) selectivity? (ii) direct impacts? (iii) indirect impacts?	
15b	Is the impact of swept gear on bottom biocoenoses known?	
16	Is the impact of fishing on life history traits (e.g. growth and size at maturity) known?	
17a	a) Is the genetic diversity of the key populations known?	
17b	Is the fishery seriously impacting local genetic components, races or sub-populations?	
18a	Have the livelihoods of those dependent on the resource been documented?	
18b	Have social and economic priorities been established for different groups dependent on a specific resource?	
18c	Are different grounds or depth ranges set aside for different groups of fishers?	
19	Has there been an attempt to rank the importance of impacts of different human activities on the key fauna components in the area?	
20	On this basis, have operational objectives and/or management plans been established?	
21	Have performance measures been established for the objectives?	
22	Have indicators been established to measure the status of the fishery in relation to each of the objectives?	
23	Has a limit reference point or a yellow/red colour boundary for a traffic light system been established for each indicator?	
24a	Has a formal management rule been established which specifies what actions will be taken if limit reference points or colour boundaries are exceeded?	
24b	Is there a procedure for monitoring system performance?	
24c	Is there a system of dispute settlement or an authority that can be contacted, in case of unexpected impacts documented by third parties?	
25	Have obligatory actions under the management rule been discussed with stakeholders?	

Application of the Ecosystem Approach to Fisheries		
Item No.	**Question:**	**Scoring (comments)**
26	Are steps taken under ecosystem management transparent and available to interested parties?	
27a	Are fiscal or institutional measures being used as incentives to responsible fishing?	
27b	Is the use of subsidies being avoided?	
28	Are public education systems being used to instil collective values in favour of resource/environmental conservation and standards of behaviour?	
29	Has the impact of a particular management measure affecting a prey or predator been considered on other species linked to it in the food web?	
30	Are monitoring control and surveillance measures adequate to ensure conservation of marine resources?	
31	Are specific measures taken in each fishery to limit their impacts to those agreed for the target species?	
32	Are management measures compatible across all jurisdictions inside the species range?	
33	Is the precautionary approach being applied in the case of limited information?	
34a	Are seasonal closures used to protect critical life history stages such as spawnings or migrations?	
34b	Are some areas closed against bottom gear? (*Give estimated percentage in footnote)*	
34c	Are year-round closed areas (MPAs) used to protect impacted resources or habitats?	
34d	What proportion of the stock area is included inside a MPA? (*give estimated percentage in footnote*)	
34e	Is it prohibited to trawl in vegetated areas or where epifauna is abundant?	
34f	Are there special protective regimes for critical structural elements of the habitat such as mangroves, seagrass beds, or coral reefs? (*Specify*)	
35	Are measures being taken to restore damaged areas of habitat with structural complexity?	
36a	Are artificial structural elements being added to the habitat?	
36b	Do these risk making fishery resources more vulnerable to fishing?	
37	Have considerations of connectivity of habitats used by different life history stages been considered?	
38	Are measures in place to encourage rebuilding of stocks which have fallen below biomass levels considered dangerous?	
39a	Are user rights allocated at the individual, community or cooperative level?	
39b	Is the “user pays” principle being applied in setting license fees or other access regulations?	
40	Has there been coordination between IUCN registered species lists and national lists of species in need of protection?	

Appendix 2B. Community-based Management

Note:

Integration of fisheries into coastal area management and rights-based and co-management or community-based provisions have been the subject of vigorous debate in recent years, and this debate has now gone further into detail than provided for in the Code. A variety of reports have recently been published on the application of community-based criteria, and the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem held under the auspices of FAO in October 2001 (see: www.fao.org/fi), has led to further development of strategies in the new context of ecosystem management**.** There is no specific Article on community-based management in the Code, though its Article 7 (Fisheries management), Article 9 (Aquaculture development) and Article 10 (Integration of fisheries into coastal area management) all contain direct and indirect references to the need to involve local stakeholders in management decision-making and practice.

These articles have been consulted, along with their associated Technical Guidelines and, together with suggestions of the Guaymas workshop attendees, form the basis for the following questionnaire.

Draft Questionnaire: Application of Community-based Fisheries Management

Note:

Suggested scoring options are the same as for Article 7.

Application of Community-based Fisheries Management		
Item No.	**Question:**	**Scoring (comments)**
1	Has Government enabled policies and legislation needed in support of co-management initiatives?	
2	Have local community fisher associations or organizations been set up?	
3	Are existing community fisher associations or organizations administratively and financially capable of implementing co-management?	
4	Do fisheries management authorities share power with community-based fisher associations or organizations?	
5	Do fisheries management authorities personally participate in co-management-related capacity-building and training activities within local communities?	
6	Have all stakeholders been identified and included in the co-management arrangements?	
7	Is the diversity (ethnic, cultural, social, economic, environmental) in coastal communities being recognized and addressed?	
8	Are the needs for aquatic resource use in the locality/region that involve multiple stakeholders (and possibly multiple conflicts) being addressed through dialogue and consultation between stakeholders and other interested parties?	
9	Are incentives (economic, social) provided to encourage individuals to actively engage in co-management?	
10	Are property rights approaches being used?	
11	Do non-governmental organizations support the co-management process?	

Application of Community-based Fisheries Management		
Item No.	**Question:**	**Scoring (comments)**
12	Are there mechanisms to address potential or actual conflicts?	
13	Has an attempt been made to search for optimal partnerships between different levels of government?	
14a	Has an attempt been made to identify possible partnerships at all levels of government?	
14b	Have the complementary strengths of different parties been taken into account in planning co-management?	
15a	Has there been an attempt to balance national priorities with local needs and livelihoods?	
15b	Has there been an attempt to build trust between governments and local institutions?	
15c	Has there been an attempt to build institutions that can be effective at the local level in a co-management context?	
16	Has there been a specific delegation of powers to local level with respect to the implementing the issues mentioned in the Code?	
17	Has an attempt been made to set up common functions accessible to all government levels such as data storage, stock assessment, and economic analysis, so as to avoid duplication, and avoid competition between different institutions?	
18a	Have clear boundaries been established between adjacent jurisdictions?	
18b	Do fishery participants require a license to operate?	
18c	Are there limitations on the number of licenses?	
18d	Has the resource been defined and open access conditions effectively eliminated?	
19	Have context-appropriate rules been established as appropriate to the situation?	
20	Are graduated sanctions in effect for those who violate agreed-upon rules?	
21	Are local government institutions able to devise their own rules, unchallenged by higher level institutions?	
22	Do existing resource management institutions provide a hierarchy of governance structures?	

Appendix 2C. Example of scorings for the ecosystem approach questionnaire used at the Gulf of California workshop

		Based on individual scorings of nine experts, 56% of 86 questions evaluated need:	
Question		**Action (49%)**	**Further investigation (7%)**
1.	Have broad social, economic and ecological issues regarding the fauna/flora of the area been taken into account?	X	
2.	Have broad ecosystem policies objectives been defined?	X	
3.	Have international, national and local policy goals for ecosystem uses been considered?	X	
4.	Are these geographical data sets available on a GIS format?	X	
5.	Are interactions between stocks/ecosystem and human uses assessed?	X	
6.	Are interactions between stocks/ecosystem and human uses used for management?	X	
7.	Are campaigns held periodically to recover discarded gear?	X	
8.	Are those discards quantified in terms of vulnerable life stages (juveniles, mature etc.) of commercial species?	X	
9.	Are those discards quantified in terms of non-commercial species?	X	
10.	Are those discards quantified in terms of charismatic or protected species?	X	
11.	Is it known which species consume discards and what would be the impact of discarding or not on their populations?	X	
12.	Are critical life history stages known?	X	
13.	Are migrations known?	X	
14.	Are bottlenecks in the life history known?	X	
15.	Are habitat characteristics of key species known?	X	
16.	Have the effects of existing management measures on the fauna of the area been identified?	X	
17.	Is the impact of fishing on life history traits (e.g. growth and size at maturity) known?	X	
18.	Is the genetic diversity of the key populations known?	X	
19.	Has there been an attempt to rank the importance of different impacts of human activities on the different fauna components in the area?	X	
20.	On this basis, have operational objectives been established?	X	
21.	Have performance measures been established for the above objectives?	X	
22.	Have indicators been established to measure the status of the fisheries in relation to the above objectives?	X	
23.	Has a limit reference point or a yellow/red colour boundary for a traffic light system been established for each indicator?	X	
24.	Has a formal management rule been established which specifies what actions will be taken if limit reference points or colour boundaries are exceeded?	X	
25.	Is there a procedure for monitoring ecosystem integrity?	X	
26.	Have obligatory actions under the management rule been discussed with stakeholders?	X	

		Based on individual scorings of nine experts, 56% of 86 questions evaluated need:	
Question		**Action (49%)**	**Further investigation (7%)**
27.	Is there a system of dispute settlement?	X	
28.	Are steps taken under ecosystem management transparent and available to interested parties?	X	
29.	Has the impact of a particular management measure affecting a prey and/or predator species been considered on other species linked to it in the food web?	X	
30.	Are specific measures taken in each fishery to limit their impacts to those agreed for the target species?	X	
31.	Are year-round closed areas (MPAs) used to protect habitats?	X	
32.	What proportion of the fishable area in the Gulf of California is included inside a MPA? (give estimated %)	X	
33.	Is it prohibited to trawl in vegetated areas or where epifauna is abundant?	X	
34.	Are measures being taken to restore areas of habitat with structural complexity?	X	
35.	Are artificial structural elements being added to the habitat?	X	
36.	Does adding artificial structural elements risk making fishery resources more vulnerable to fishing?	X	
37.	Have considerations of connectivity of habitats used by different life history stages been considered?	X	
38.	Are measures in place to encourage rebuilding of stocks/communities which have fallen below size levels considered dangerous?	X	
39.	Have waste and pollution been evaluated?	X	
40.	Are fiscal or institutional measures being used as incentives to responsible fishing?	X	
41.	Have the livelihoods of those dependent on the resource been documented?	X	
42.	Are different grounds or depth ranges set aside for different groups of fishermen?	X	
43.	Is the impact of swept gear on bottom biocoenoses known?		X
44.	Is the fishery seriously impacting local genetic components, races or sub-populations?		X
45.	Have discards been evaluated?		X
46.	Have physical effects on communities been evaluated?		X
47.	Are user rights allocated at the individual, community or cooperative level? Is the “user pays” principle being applied in setting license fees or other access regulations?		X
48.	Have social and economic priorities been established for different groups dependent on a specific resource?		X

APPENDIX 3.

APPLICATION OF THE FAO CODE OF CONDUCT FOR RESPONSIBLE FISHERIES TO THE HAWAII LONGLINE FISHERIES

Selected examples of Hawaii longline fisheries scorecards (with scores of: 1 = yes; 0.5 = partial/some; and 0 = no).

Article 8.1.8 States should, as appropriate, maintain records of fishers which should, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their national laws.

Question format (Caddy, 1996): Are records of fishers being maintained which should, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their national laws? ***Yes...***[1] ***In part...***[½] ***No...***[0]

Extent of Compliance by Hawaii Pelagic Longline Fisheries = ½		
Yes	*Some*	*No*
	Certificates of competency are not required for crew members in Hawaii longline fisheries. Every crew member of Hawaii longline vessels must have a State of Hawaii commercial marine license but certification of qualifications or competency is not required.[1] Many of the fishermen serving on Hawaii longline vessels are recruited from overseas. They complete hiring documentation at manning agencies in their home countries. Typically, these agencies require fishermen to possess a seaman's book that contains information on past service and training.[2] Records are maintained of mandatory annual participation by all Hawaii longline owners and operators in protected species training workshops conducted by National Marine Fisheries Service Pacific Islands Regional Office.[3]	

[1]Hawaii Administrative Rule Chapter 13-74

[2]Dr Stewart Allen, Social Scientists, National Marine Fisheries Service, Pacific Islands Fisheries Science Center, Honolulu, HI, personal communication. stewart.allen@noaa.gov

[3]http://swr.nmfs.noaa.gov/pir/pswhlf.htm

Article 8.4.3 States should make every effort to ensure that documentation with regard to fishing operations, retained catch of fish and non-fish species and, as regards discards, the information required for stock assessment as decided by relevant management bodies, is collected and forwarded systematically to those bodies. States should, as far as possible, establish programmes, such as observer and inspection schemes, in order to promote compliance with applicable measures.

Question format (Caddy, 1996): (a) Is documentation required with regard to fishing operations, retained catch of fish and non-fish species and, as regards discards, the information required for stock assessment as decided by relevant management bodies, collected and forwarded systematically to those bodies?

- Documentation of fishing operations: ***Yes...***[1] ***In part...***[½] ***No...***[0]		
Extent of Compliance by Hawaii Pelagic Longline Fisheries = 1		
Yes	*Some*	*No*
	For each longline fishing trip by a Hawaii vessel, a logbook must be submitted by the vessel operator to the National Oceanographic and Atmospheric Administration (NOAA) Fisheries Pacific Islands Fisheries Science Center (PIFSC) providing detailed information about fishing operations per set, time and location.[1,2] This information is summarized quarterly by PIFSC's Fisheries Monitoring and Analysis Programme[3] to prepare status reports for inclusion in the Western Pacific Fishery Management Council's Pelagics Fishery Management Plan annual report[4] (which meets the NOAA Fisheries requirement for an annual stock assessment and fishery evaluation report) and Fisheries of the United States annual report. Congressional approval of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 clears the way for the U.S. to become a member of the Western and Central Pacific Fisheries Commission (WCPFC), obligating the U.S. to provide information to WCPFC, as well as to the Inter-American Tropical Tuna Commission, of which the U.S. is a founding member.[5,6] Similar per-set information by time and location is collected by federally-mandated observers on at least 20% of deep-set tuna longline trips[7] and 100% of shallow-set swordfish longline trips[8] by Hawaii vessels. These observations are summarized quarterly by NOAA's Pacific Islands Regional Office.[9]	

[1]CFR, Title 50, 665.14, http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=c5de2425b76f4171298264aa3a90c3f3&rgn=div8&view=text&node=50:9.0.1.1.2.2.1.4&idno=50

[2]Pacific Island Fisheries Science Center, NMFS Western Pacific Daily Longline Fishing Log

[3]Pacific Island Fisheries Science Center, The Hawaii-based Longline Logbook Summary Report *October-December 2005*

[4]Western Pacific Fishery Management Council, Pelagics Fishery Management Plan annual report

[5]Scientific Committee, http://www.wcpfc.int/

[6]Resolution on Data Provision, www.iattc.com

[7]Biological Opinion on the Hawaii-based pelagic, deep-set longline fishery, October 4, 2005, 5.2.1

- Documentation of non-fish catches: ***Yes...***[1] ***In part...***[½] ***No...***[0]		
Extent of Compliance by Hawaii Pelagic Longline Fisheries = 1		
Yes	*Some*	*No*
	For each longline fishing trip by a Hawaii vessel, a logbook must be submitted by the vessel operator to the National Oceanographic and Atmospheric Administration (NOAA) Fisheries Pacific Islands Fisheries Science Center (PIFSC) providing detailed information about fishing operations per set, time and location.[1,2] This information is summarized quarterly by PIFSC's Fisheries Monitoring and Analysis Programme[3] to prepare status reports for inclusion in the Western Pacific Fishery Management Council's Pelagics Fishery Management Plan annual report[4] (which meets the NOAA Fisheries requirement for an annual stock assessment and fishery evaluation report) and Fisheries of the United States annual report. Congressional approval of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 clears the way for the U.S. to become a member of the Western and Central Pacific Fisheries Commission (WCPFC), obligating the U.S. to provide information to WCPFC, as well as to the Inter-American Tropical Tuna Commission.[5,6] Similar per-set information by time and location is collected by federally-mandated observers on at least 20% of deep-set tuna longline trips[7] and 100% of shallow-set swordfish longline trips[8] by Hawaii vessels. These observations are summarized quarterly by NOAA's Pacific Islands Regional Office.[9]	

[1]CFR, Title 50, 665.14, http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=c5de2425b76f4171298264aa3a90c3f3&rgn=div8&view=text&node=50:9.0.1.1.2.2.1.4&idno=50

[2]Pacific Island Fisheries Science Center, NMFS Western Pacific Daily Longline Fishing Log

[3]Pacific Island Fisheries Science Center, The Hawaii-based Longline Logbook Summary Report *October-December 2005*

[4]Western Pacific Fishery Management Council, Pelagics Fishery Management Plan annual report

[5]Scientific Committee, http://www.wcpfc.int/

[6]Resolution on Data Provision, http://www.iattc.com

[7]Biological Opinion on the Hawaii-based pelagic, deep-set longline fishery, October 4, 2005, 5.2.1

- Documentation of fish catches: ***Yes...***[1] ***In part...***[½] ***No...***[0]		
Extent of Compliance by Hawaii Pelagic Longline Fisheries = 1		
Yes	*Some*	*No*
	For each longline fishing trip by a Hawaii vessel, a logbook must be submitted by the vessel operator to the National Oceanographic and Atmospheric Administration (NOAA) Fisheries Pacific Islands Fisheries Science Center (PIFSC) providing detailed information about fishing operations per set, time and location.[1,2] This information is summarized quarterly by PIFSC's Fisheries Monitoring and Analysis Programme[3] to prepare status reports for inclusion in the Western Pacific Fishery Management Council's Pelagics Fishery Management Plan annual report[4] (which meets the NOAA Fisheries requirement for an annual stock assessment and fishery evaluation report) and Fisheries of the United States annual report. Congressional approval of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 clears the way for the U.S. to become a member of the Western and Central Pacific Fisheries Commission (WCPFC), obligating the U.S. to provide information to WCPFC, as well as to the Inter-American Tropical Tuna Commission.[5,6] Similar per-set information by time and location is collected by federally-mandated observers on at least 20% of deep-set tuna longline trips[7] and 100% of shallow-set swordfish longline trips[8] by Hawaii vessels. These observations are summarized quarterly by NOAA's Pacific Islands Regional Office.[9]	

[1]CFR, Title 50, 665.14, http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=c5de2425b76f4171298264aa3a90c3f3&rgn=div8&view=text&node=50:9.0.1.1.2.2.1.4&idno=50

[2]Pacific Island Fisheries Science Center, NMFS Western Pacific Daily Longline Fishing Log

[3]Pacific Island Fisheries Science Center, The Hawaii-based Longline Logbook Summary Report *October-December 2005*

[4]Western Pacific Fishery Management Council, Pelagics Fishery Management Plan annual report

[5]Scientific Committee, http://www.wcpfc.int/

[6]Resolution on Data Provision, www.iattc.com

[7]Biological Opinion on the Hawaii-based pelagic, deep-set longline fishery, October 4, 2005, 5.2.1

[8]U.S. Fish and Wildlife Service Biological Opinion on the effects of the reopened shallow-set sector of the Hawaii-based longline fishery on the short-tailed albatross (*Phoebastria albatrus*), October 8, 2004, Formal Consultation Log Number 1-2-1999-F-02.2, pp 71-72

[9]Pacific Islands Regional Observer Programme Quarterly Status Reports

Article 8.6.2 States should promote the development and transfer of technology in relation to energy optimization within the fisheries sector and, in particular, encourage owners, charterers and managers of fishing vessels to fit energy optimization devices to their vessels.

Question format (PacMar Inc. 2006): Is the development and transfer of technology being promoted in relation to energy optimization within the fisheries sector and, in particular, encourage owners, charterers and managers of fishing vessels to fit energy optimization devices to their vessels?

Yes...[1] ***In part...***[½] ***No...***[0]

Extent of Compliance by Hawaii Pelagic Longline Fisheries = 0		
Yes	*Some*	*No*
		Hawaii longline vessels store fresh fish catches in insulated holds chilled with ice[1], thereby eliminating the high energy costs associated with large refrigerated storage systems. However, fitting of Hawaii longline vessels with energy optimization devices and transfer of technology are not actively promoted.

[1]Kaneko, John. 2000. Development of a HACCP-based Strategy for the Control of Histamine for the Fresh Tuna Industry, p 17.

A summary of the scorecard results:

CCRF Article	**Score**	**Notes**
Article 7 (Fishery Management)	96%	109 of 113 possible points
Article 8 (Fishing Operations)	93%	70 of 76 possible points
Article 10 (Integration with Coastal Zone Managementt)	71%	15 of 21 possible points
Article 11 (Post-harvest practices and trade)	95%	38 of 40 possible points
Article 12 (Fisheries Research)	91%	30 of 33 possible points

Hawaii longline fisheries received a summary score of 93% compliance (262 of 282 points) with the 5 Articles that were evaluated. The fisheries scored over 90 percent for provisions of the Code relating to fishery management (Article 7), fishing operations (Article 8), post-harvest catch handling, utilization and trade (Article 11), and fisheries research (Article 12). The integration of fisheries into coastal zone management (Article 10) is not directly applicable to Hawaii longline fisheries, which operate in the open ocean. Nevertheless, the assessment was extended to Article 10 and longline fisheries received 71 percent of possible points. Hawaii longline fisheries score relatively high not only for provisions of the Code that express intent and proper direction for fisheries management, but also for provisions that measure compliance based on actual practices.

APPENDIX 4.

THE POTENTIAL ROLE OF NON-SPECIALIST ORGANIZATIONS IN MONITORING FISHERIES PERFORMANCE

Note:

The following draft is suggested as a core questionnaire that might be used to evaluate the state of management and exploitation of marine resources without a high level of involvement by fishery specialists.

Characteristics of the fishery for resource A over the last decade	**Yes** *Green*	**Maybe/ partial** *Yellow*	**No** *Red*
A. OUTPUTS			
1) Landings are still above 50% of the average for the best three years landings on record (FAO Statistics?)?			
2) Landings (all fleets) have not declined significantly over the last 5 years?			
3) Catch rates by standard vessels have not declined significantly over the last 5 years?			
4) The fleet capacity utilizing the resource has not grown by more than 10% since the best three years landings on record?			
5) Prices for the product on the domestic/international market have not grown by more than 15% over the last 5 years?			
6) Biological data are collected in port, OR by at-sea observers, OR copies of catch log books are completed and collected by officials?			
7) The capture of protected species is actively discouraged?			
8) The integrity/diversity of resources/habitats is being actively maintained?			
9) Illegal or unreported fishing is being kept under strict control?			

Characteristics of the fishery for resource A over the last decade	Yes *Green*	Maybe/ partial *Yellow*	No *Red*
B. INPUTS			
10) Research vessel surveys are carried out at regular intervals?			
11) There is a limited license system in operation that covers all vessels fishing the resource?			
12) There is a system of licence transfers that ensures that fleet capacity is not increasing?			
13) There is a system of at-sea surveillance of the fleet operation or on-board observers			
14) Biologists employed to evaluate the fishery have at least Masters in Science education?			
15) A management plan exists for the fishery?			
16) Closed areas or MPAs are in effect, OR areas within the stock range are still unfished or form refugia?			
17) For shared, straddling and highly migratory stocks, there are agreements or negotiations in course with other users of the resource?			
18) The government fisheries agency meets regularly with local community or fishing industry representatives?			

SUPPLEMENT A.

THE OFFICIAL FAO QUESTIONNAIRE ON CODE IMPLEMENTATION

Country: .....
Name of person (optional):.....
Date: .....

GENERAL QUESTIONS

1. Article 2 of the Code of Conduct lists ten objectives. Please rank your perception of the relevance of these objectives for the various types of fisheries including inland capture fisheries and aquaculture developments in your country.		1 = not very relevant 3 = relevant 5 = extremely relevant				
Objectives		**Rating**				
		1	**2**	**3**	**4**	**5**
1	Establish principles for responsible fishing and fisheries activities considering all their relevant biological, technical, economic, social, environmental and commercial aspects					
2	Establish principles and criteria to implement policies for the conservation of fishery resources and fisheries management and development					
3	Serve as an instrument of reference to improve legal and institutional framework for appropriate management measures					
4	Provide guidance to formulate and implement international agreements and other legal instruments					
5	Facilitate and promote co-operation in the conservation of fisheries resources, fisheries management and development					
6	Promote the contribution of fisheries to food security and food quality giving priority to the nutritional needs of local communities					
7	Promote protection of living aquatic resources and their environments and coastal areas					
8	Promote the trade in fish and fishery products in conformity with relevant international rules					
9	Promote research on fisheries as well as on associated ecosystems and relevant environmental factors					
10	Provide standards of conduct for all involved in the fisheries sector					

2. Please list in priority order the 3 main constraints to implementation of the Code in your country and propose possible solutions.

	Main Constraints	**Suggested Solutions**
1		
2		
3		

3. Do fisheries legislation and policies in your country conform to the Code of Conduct?	**Yes**	**No**	**Partially**
3.a If no, does your country intend to introduce changes to its fisheries legislation and/or policy to bring them into conformity with the Code of Conduct?			
3.b If yes to 3.a, when do you expect to introduce those changes?	Date		

4. Please describe efforts that have been made to make the Code more widely known and understood within your country.

5. Please indicate the level of priority your country attaches to the following substantive themes that are developed in the Code and in the relevant FAO Technical Guidelines for Responsible Fisheries*			
	Top Priority	**Priority**	**Low Priority**
Fisheries Management			
Fishing Operations			
Aquaculture Development			
Integration of Fisheries into Coastal and Basin Area Management			
Post-Harvest Practices			
Trade			
Fisheries Research			
Inland Fisheries Development			

ARTICLE 7 OF THE CODE OF CONDUCT - FISHERIES MANAGEMENT

	Marine Capture Fisheries	**Inland Capture fisheries**	**None**
6. How many of the fisheries in your country have fisheries management plans in place?			
6.a If your country has fisheries management plans, how many have been implemented?			

6.b If your country has Marine fisheries management plans, do all or any of them:	**Yes**	**No**
Contain measures to ensure the level of fishing is commensurate with the state of fisheries resources		
Contain measures to allow depleted stocks to recover		
Contain stock specific target reference points		
Address selectivity of fishing gear		
Prohibit destructive fishing methods and practices (e.g. dynamiting and poisoning)		
Address fishing capacity including the economic conditions under which the fishing industry operates		
Address the biodiversity of aquatic habitats and ecosystems, including identifying essential fish habitats		
Provide for stakeholder participation in determining management decisions		
Address the protection of endangered species		
Address the interests of small-scale fishers		

* FAO has elaborated as of February 2004 the following Technical Guidelines on the Code: Fishing Operations; Vessel Monitoring Systems; Precautionary Approach to Capture Fisheries and Species Introductions; Integration of Fisheries Into Coastal Area Management; Fisheries Management; Conservation and Management of Sharks; Aquaculture Development; Good Aquaculture Feed Manufacturing Practice; Inland Fisheries; Responsible Fish Utilization, Indicators for Sustainable Development of Marine Capture Fisheries and Implementation of the IPOA-IUU Fishing. Further guidelines are being developed.

6.c	If your country has Inland fisheries management plans, do all or any of them:	Yes	No
	Contain measures to ensure the level of fishing is commensurate with the state of fisheries resources		
	Contain measures to allow depleted stocks to recover		
	Contain stock specific target reference points		
	Address selectivity of fishing gear		
	Prohibit destructive fishing methods and practices (e.g. dynamiting and poisoning)		
	Address fishing capacity including the economic conditions under which the fishing industry operates		
	Address the biodiversity of aquatic habitats and ecosystems, including identifying essential fish habitats		
	Provide for stakeholder participation in determining management decisions		
	Address the protection of endangered species		
	Address the interests of small-scale fishers		
	Contain measures to ensure the level of fishing is commensurate with the state of fisheries resources		
	Contain measures to allow depleted stocks to recover		

7.	**Please provide any additional information you would like to submit on management measures in your country that may not be part of a specific fisheries management plan**.

8.	**For which stocks has your country developed stock specific target reference points?**[22]		None
8.a	**If none**, what other indicators or thresholds are used for managing stocks?		
8.b	**If your country has developed** stock specific target reference points:	Have they been exceeded?	Yes / No
		Are they being approached?	Yes / No
8.c	**If exceeded**, what action has been, or will be taken to remedy the situation?		

9.	**Has the precautionary approach been applied to the management of fisheries resources in your country?**	Yes	No
9.a	**If yes,** please describe the manner in which it is being implemented in your fishery management procedures.		

[22] See FAO Code of Conduct for Responsible Fisheries – Technical Guidelines for Responsible Fisheries No. 4 for information/definitions of "reference points".

ARTICLE 8 OF THE CODE OF CONDUCT – FISHING OPERATIONS

10.	**What steps has your country taken to ensure that only fishing operations authorized by the licensing authority are conducted within waters under its jurisdiction?**
1. **2.** **3.** **None ____**	
11.	**What steps has your country taken to ensure that fishing activities of vessels flying its flag undertaken in international waters or waters under the jurisdiction of another State are reported, monitored and carried out in a responsible manner?**
1. **2.** **3.** **None ____**	
12.	**What measures has your country taken to limit bycatch (e.g. juveniles, non-target species, non-fish species) and discards?**
1. **2.** **3.** **None ____**	

13.	**Has your country implemented a vessel monitoring system (VMS) for:** (please check **(x)** one**)**	**The entire fishing fleet**	**A portion of the fishing fleet**	**None of the fishing fleet**
13.a	**If your country has not implemented VMS for any of its vessels,** is it planning to do so in the future?	**Yes**	**No**	

ARTICLE 9 OF THE CODE OF CONDUCT – AQUACULTURE DEVELOPMENT

14.	**Please briefly describe the legal and institutional framework your country has for the development of responsible aquaculture.**		
No Framework ____			
15.	**Has a code or instrument of best practices for aquaculture been developed or adopted by government agencies, producer organizations, suppliers, manufacturers and/or other stakeholders in your country?**	**Yes**	**No**
	Government agencies		
	Producer organizations		
	Suppliers		
	Manufacturers		
	Other stakeholders		
15.a	**If yes,** please provide a brief description of that code or instrument or attach a copy of it		

16. **Are there procedures in place to:**	**Yes**	**No**
Undertake environmental assessments of aquaculture operations?		
Monitor aquaculture operations?		
Minimize the harmful effects of the introduction of non-native species or genetically altered stocks used for aquaculture?		

16.a	**If "yes",** please provide your assessment of the effectiveness, and identify needs for improvement, of such measures.	**Assessment of Effectiveness**	**Needs for Improvement**
Environmental assessments of aquaculture operations			
Monitoring of aquaculture operations			
Minimizing the harmful effects of the introduction of non-native species or genetically altered stocks used for aquaculture			

17.	**Please list in order of importance up to three measures (including policies and practices) that are being advanced and/or supported to promote responsible aquaculture practices in support of rural communities, producer organizations and fish farmers.**
1. **2.** **3.**	
17.a	**For those measures which are being developed,** please provide your assessment of specific assistance needs.
1. **2.** **3.**	

ARTICLE 10 OF THE CODE OF CONDUCT – INTEGRATION OF FISHERIES INTO COASTAL AREA MANAGEMENT

18.	**Please identify the laws constituting the legal framework in place in your country for integrated coastal area management.**
None ____	

19.	**Please indicate the level of conflict in your country within the fisheries sector and between the fisheries sector and the activities of other sectors.**				
Conflict between:		**Strong**	**Moderate**	**Light**	**None**
	Coastal fisheries and industrial fisheries				
	Coastal fisheries and coastal aquaculture				
	Gear types operating in the coastal area				
	Fisheries and recreational development				
	Fisheries and port development				
	Fisheries and mineral extraction activities				

20.	**Does your country have a mechanism to resolve conflicts over the use of coastal resources in the following areas?**	**Yes**	**No**
	Coastal fisheries versus industrial fisheries		
	Costal fisheries versus coastal aquaculture		
	Conflicts between gear types operating in the coastal area		
	Conflicts between fisheries and recreational development		
	Conflicts between fisheries and port development		
	Conflicts between fisheries and mineral extraction		

ARTICLE 11 OF THE CODE OF CONDUCT – POST-HARVEST PRACTICES AND TRADE

21.	**Is an effective food safety and quality assurance system for fisheries products in place?**	**Yes**	**No**
22.	**What measures have been taken to encourage those involved in fish processing, distribution and marketing to reduce post-harvest losses and wastes, starting with the most effective.**		
1. **2.** **3.** **None ____**			
23.	**What measures have been taken to encourage those involved in fish processing, distribution and marketing to improve the use of bycatch, starting with the most effective.**		
1. **2.** **3.** **None ____**			
24.	**Can processor and/or consumers easily identify the origin of the product raw material?**	**Yes**	**No**
	Processors		
	Consumers		
25.	**Please describe measures that have been taken to ensure that fisheries processors, brokers and dealers do not process or trade in illegally harvested fisheries resources.**		
1. **2.** **3.** **None ____**			

ARTICLE 12 OF THE CODE OF CONDUCT – FISHERIES RESEARCH

26.	**For how many stocks in your country have you obtained reliable estimates of the status of the stocks (e.g. biomass or state of exploitation) within the last three years?**	**Number:**	
26.a	Please represent this as a percentage of the total number of stocks important to your national fisheries.	**Percentage:**	
27.	**Is your country collecting timely, complete and reliable statistics on catch and fishing effort?**	**Yes**	**No**
28.	**Does your country have the qualified personnel needed to generate the necessary data to sustainably manage fisheries?**		
28.a	**If no,** in what subject areas do you have the greatest need for additional qualified personnel?		
29.	**Are the following used to provide data for the development of fisheries management plans?**	**Yes**	**No**
	Catch and effort data from commercial and artisanal fisheries (small or large scale)		
	Research vessel surveys		
	On-board sampling from commercial vessels		
	In-port sampling surveys		
	Other – please specify		

30.	**Please identify key data gaps in managing your country's fisheries resources, along with measures taken to address them and constraints faced in that task.**		
	Key Data Gaps	**Measures Taken**	**Constraints**
1.			
2.			
3.			

31.	**Is your country routinely monitoring the state of the marine environment?**	**Yes**	**No**
31.a	**If yes**, please briefly describe your efforts in this area.		
32.	**Is your country routinely monitoring bycatch and/or discarded species?**	**Yes**	**No**
32.a	**If yes**, please briefly describe your efforts in this area.		

CONCLUDING QUESTIONS

44.	**Has your country ratified, acceded or accepted the:**	**Yes**	**No**
	1993 FAO Compliance Agreement (1993 FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas)		
	1995 UN Fish Stocks Agreement (1995 UN 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)		
44.a.	**If no,** has your country initiated the process to ratify, accede or accept, as the case may be**:**	**Yes**	**No**
	1993 FAO Compliance Agreement		
	1995 UN Fish Stocks Agreement		
44.b	**If yes,** when do you expect to ratify, accede or accept the Agreement(s), as the case may be?	**Date(s):**	

45.	**Article 5 of the Code of Conduct urges that the special requirements of developing countries be taken into account in implementing the provisions of the Code. Please provide any comments you may have regarding cooperation in implementing the Code between developing and developed countries and regions.**		
46.	**Which of these FAO Technical Guidelines for Responsible Fisheries have you received?**	**Yes**	**No**
1.	Fishing operations		
1.1	Vessel monitoring systems		
2.	Precautionary approach to capture fisheries and species introductions		
3.	Integration of fisheries into coastal area management		
4.	Fisheries management		
4.1	Conservation and management of sharks		
4.2	Ecosystem approach to fisheries		
5.	Aquaculture development		
5.1.	Good aquaculture feed manufacturing practice		
6.	Inland fisheries		
7.	Responsible Fish Utilization		
8.	Indicators for sustainable development of marine capture fisheries		
9.	Implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing		
10.	Increasing the contribution of small-scale fisheries to poverty alleviation and food security		

47.	**Please submit any other comments or information you wish to provide regarding implementation of the Code of Conduct in your country.**	
48.	**Please enclose copies, electronically or in hard copy, of National Plans of Action if they have been developed and/or national legislation relevant to implementation of the Code of Conduct.**	**Enclosures**
49.	**DONOR COUNTRIES, please indicate technical or financial assistance provided to developing countries for implementation of the Code.**	

SUPPLEMENT B.

EXTRACT FROM AN OFFICIAL RESPONSE TO THE FAO QUESTIONNAIRE ON CODE IMPLEMENTATION

GENERAL QUESTIONS

1. Article 2 of the Code of Conduct lists ten objectives. Please rank your perception of the relevance of these objectives for the various types of fisheries including inland capture fisheries and aquaculture developments in your country.

1 = not very relevant
3 = relevant
5 = extremely relevant

	Objectives	Rating				
		1	2	3	4	5
1	Establish principles for responsible fishing and fisheries activities considering all their relevant biological, technical, economic, social, environmental and commercial aspects					X
2	Establish principles and criteria to implement policies for the conservation of fishery resources and fisheries management and development				X	
3	Serve as an instrument of reference to improve legal and institutional framework for appropriate management measures			X		
4	Provide guidance to formulate and implement international agreements and other legal instruments				X	
5	Facilitate and promote co-operation in the conservation of fisheries resources, fisheries management and development				X	
6	Promote the contribution of fisheries to food security and food quality giving priority to the nutritional needs of local communities			X		
7	Promote protection of living aquatic resources and their environments and coastal areas			X		
8	Promote the trade in fish and fishery products in conformity with relevant international rules			X		
9	Promote research on fisheries as well as on associated ecosystems and relevant environmental factors				X	
10	Provide standards of conduct for all involved in the fisheries sector				X	

2. Please list in priority order the 3 main constraints to implementation of the Code in your country and propose possible solutions.

	Main Constraints	Suggested Solutions
1	Problems in applying the principles of the Code in practical fishery management 1. The precautional principles are not always applied	A better dialog with stakeholders and creation of an awareness for the long-term gains
2	2. Unreported catches	Improved surveillance
3	3. Present fishery management instrument are not always applicable	Development of management instruments

		Yes	No	Partially
3.	**Do fisheries legislation and policies in your country conform to the Code of Conduct?**	X		
3.a	**If no,** does your country intend to introduce changes to its fisheries legislation and/or policy to bring them into conformity with the Code of Conduct?			
3.b	**If yes to 3.a**, when do you expect to introduce those changes?	Date		

4. Please describe efforts that have been made to make the Code more widely known and understood within your country.

5.	Please indicate the level of priority your country attaches to the following substantive themes that are developed in the Code and in the relevant FAO Technical Guidelines for Responsible Fisheries*	Top Priority	Priority	Low Priority
	Fisheries Management	X		
	Fishing Operations		X	
	Aquaculture Development		X	
	Integration of Fisheries into Coastal and Basin Area Management		X	
	Post-Harvest Practices		X	
	Trade		X	
	Fisheries Research		X	
	Inland Fisheries Development		X	

ARTICLE 7 OF THE CODE OF CONDUCT - FISHERIES MANAGEMENT

		Marine Capture Fisheries	Inland Capture fisheries	None
6.	**How many of the fisheries in your country have fisheries management plans in place?**	5		
6.a	**If your country has fisheries management plans,** how many have been implemented?	2		
6.b	**If your country has Marine fisheries management plans,** do all or any of them:		**Yes**	**No**
	Contain measures to ensure the level of fishing is commensurate with the state of fisheries resources		X	
	Contain measures to allow depleted stocks to recover		X	
	Contain stock specific target reference points		X	
	Address selectivity of fishing gear		X	
	Prohibit destructive fishing methods and practices (e.g. dynamiting and poisoning)		X	
	Address fishing capacity including the economic conditions under which the fishing industry operates		X	
	Address the biodiversity of aquatic habitats and ecosystems, including identifying essential fish habitats		X	
	Provide for stakeholder participation in determining management decisions		X	
	Address the protection of endangered species		X	
	Address the interests of small-scale fishers		X	

* FAO has elaborated as of February 2004 the following Technical Guidelines on the Code: Fishing Operations; Vessel Monitoring Systems; Precautionary Approach to Capture Fisheries and Species Introductions; Integration of Fisheries Into Coastal Area Management; Fisheries Management; Conservation and Management of Sharks; Aquaculture Development; Good Aquaculture Feed Manufacturing Practice; Inland Fisheries; Responsible Fish Utilization, Indicators for Sustainable Development of Marine Capture Fisheries and Implementation of the IPOA-IUU Fishing. Further guidelines are being developed.

6.c	**If your country has Inland fisheries management plans,** do all or any of them:	**Yes**	**No**
	Contain measures to ensure the level of fishing is commensurate with the state of fisheries resources	X	
	Contain measures to allow depleted stocks to recover	X	
	Contain stock specific target reference points	X	
	Address selectivity of fishing gear	X	
	Prohibit destructive fishing methods and practices (e.g. dynamiting and poisoning)	X	
	Address fishing capacity including the economic conditions under which the fishing industry operates	X	
	Address the biodiversity of aquatic habitats and ecosystems, including identifying essential fish habitats	X	
	Provide for stakeholder participation in determining management decisions	X	
	Address the protection of endangered species	X	
	Address the interests of small-scale fishers	X	
	Contain measures to ensure the level of fishing is commensurate with the state of fisheries resources	X	
	Contain measures to allow depleted stocks to recover	X	

7.	**Please provide any additional information you would like to submit on management measures in your country that may not be part of a specific fisheries management plan**.
	Most stocks of with a certain quantity and value are managed by quotas technical regulations. Management plans have first been introduced for depleted stocks. Gradually more stocks will be introduced.

8.	**For which stocks has your country developed stock specific target reference points?[23]**	Most stocks fished commercially of certain quantity and value has developed target reference points		**None**
8.a	**If none**, what other indicators or thresholds are used for managing stocks?			
8.b	**If your country has developed** stock specific target reference points:	Have they been exceeded?	**Yes** **X**	**No**
		Are they being approached?	X	
8.c	**If exceeded**, what action has been, or will be taken to remedy the situation?	Normally a recovery plan is developed		
9.	**Has the precautionary approach been applied to the management of fisheries resources in your country?**		**Yes** X	**No**
9.a	**If yes,** please describe the manner in which it is being implemented in your fishery management procedures.	The precautionary approach could both be applied when determining the reference point and when managing the fisheries.		

[23] See FAO Code of Conduct for Responsible Fisheries – Technical Guidelines for Responsible Fisheries No. 4 for information/definitions of "reference points".

ARTICLE 8 OF THE CODE OF CONDUCT – FISHING OPERATIONS

10.	**What steps has your country taken to ensure that only fishing operations authorized by the licensing authority are conducted within waters under its jurisdiction?**
1. An established fleet management programme with vessel licensing 2. Regulation of entry and exit 3. Surveillance to control that only authorized vessels are fishing **None** ____	
11.	**What steps has your country taken to ensure that fishing activities of vessels flying its flag undertaken in international waters or waters under the jurisdiction of another State are reported, monitored and carried out in a responsible manner?**
1. Each vessel report catches through a logbook 2. Fish landings are reported authorized buyers 3. Fishery surveillance operated by the Coast Guard make inspections at sea **None** ____	
12.	**What measures has your country taken to limit bycatch (e.g. juveniles, non-target species, non-fish species) and discards?**
1. Selective gear and panels are used 2. Areas with juveniles are closed 3. Fishing is restricted or banned during sensitive seasons **None** ____	

13.	**Has your country implemented a vessel monitoring system (VMS) for:** (please check **(x)** one**)**	**The entire fishing fleet**	**A portion of the fishing fleet**	**None of the fishing fleet**
			All vessels larger than 15 meters	
13.a	**If your country has not implemented VMS for any of its vessels,** is it planning to do so in the future?	**Yes**	**No**	

ARTICLE 9 OF THE CODE OF CONDUCT – AQUACULTURE DEVELOPMENT

14.	**Please briefly describe the legal and institutional framework your country has for the development of responsible aquaculture.**
Environmental legislation for obtaining permits for suitable location and produced quantity Fishery legislation for suitable species Animal health legislation for fish welfare and deceases **No Framework** ____	

15.	**Has a code or instrument of best practices for aquaculture been developed or adopted by government agencies, producer organizations, suppliers, manufacturers and/or other stakeholders in your country?**	**Yes**	**No**
	Government agencies	**X**	
	Producer organizations	**X**	
	Suppliers		**X**
	Manufacturers		**X**
	Other stakeholders		**X**
15.a	**If yes,** please provide a brief description of that code or instrument or attach a copy of it Ethic rules and best practice developed by the National Aquaculture Association		
16.	**Are there procedures in place to:**	**Yes**	**No**
	Undertake environmental assessments of aquaculture operations?	**X**	
	Monitor aquaculture operations?	**X**	
	Minimize the harmful effects of the introduction of non-native species or genetically altered stocks used for aquaculture?	**X**	

16.a **If "yes",** please provide your assessment of the effectiveness, and identify needs for improvement, of such measures.	**Assessment of Effectiveness**	**Needs for Improvement**
Environmental assessments of aquaculture operations	Costly and demanding (in accordance with national environmental law) A big obstacle for new enterprises to start up aquaculture business or existing enterprises to expand activity	
Monitoring aquaculture operations	Costly in terms of time spent in order to respond to request by a various authorities	
Minimizing the harmful effects of the introduction of non-native species or genetically altered stocks used for aquaculture	It is as a rule forbidden to introduce non-native pecies into wild waters	

17. Please list in order of importance up to three measures (including policies and practices) that are being advanced and/or supported to promote responsible aquaculture practices in support of rural communities, producer organizations and fish farmers.

1. There is a national strategy and a strict national regulation guiding the local authorities on how to handle applications concerning new aquaculture establishments and the introduction of native species into various wild waters
2. The national fisheries authorities enhance the development of environmentally friendly aquaculture through EU subsidies to certain investments (European Fisheries Fund)
3. A number of EU regulations concern the practices of aquaculture and this are interpreted and applied by national authorities

17.a For those measures which are being developed, please provide your assessment of specific assistance needs.

1.
2.
3.

ARTICLE 10 OF THE CODE OF CONDUCT – INTEGRATION OF FISHERIES INTO COASTAL AREA MANAGEMENT

18. Please identify the laws constituting the legal framework in place in your country for integrated coastal area management.

Fishery legislation for regulating the conflicts between coastal fisheries and industrial fisheries; coastal fisheries and coastal aquaculture; gear types operating in the coastal area.

Environmental legislation for regulating the conflicts between fisheries and recreational development; fisheries and port development; fisheries and mineral extraction activities

None ____

19. Please indicate the level of conflict in your country within the fisheries sector and between the fisheries sector and the activities of other sectors.

Conflict between:	**Strong**	**Moderate**	**Light**	**None**
Coastal fisheries and industrial fisheries			**X**	
Coastal fisheries and coastal aquaculture			**X**	
Gear types operating in the coastal area			**X**	
Fisheries and recreational development		**X**		
Fisheries and port development		**X**		
Fisheries and mineral extraction activities		**X**		

20.	Does your country have a mechanism to resolve conflicts over the use of coastal resources in the following areas?	Yes	No
	Coastal fisheries versus industrial fisheries	X	
	Coastal fisheries versus coastal aquaculture	X	
	Conflicts between gear types operating in the coastal area	X	
	Conflicts between fisheries and recreational development	X	
	Conflicts between fisheries and port development	X	
	Conflicts between fisheries and mineral extraction	X	

ARTICLE 11 OF THE CODE OF CONDUCT – POST-HARVEST PRACTICES AND TRADE

21.	Is an effective food safety and quality assurance system for fisheries products in place?	Yes	No
		X	

22. What measures have been taken to encourage those involved in fish processing, distribution and marketing to reduce post-harvest losses and wastes, starting with the most effective.

1. Introduction of HACCP (Hazard Analysis and Critical Control Points) to improve handling of the fish in the fishing industries
2. Quality inspection of landed fish and later in the processing and marketing chain
3. Support for development of new products and better utilization of landed fish

None ____

23. What measures have been taken to encourage those involved in fish processing, distribution and marketing to improve the use of bycatch, starting with the most effective.

1.
2.
3.
None _X__

24.	Can processor and/or consumers easily identify the origin of the product raw material?	Yes	No
	Processors	X	
	Consumers		X

25. Please describe measures that have been taken to ensure that fisheries processors, brokers and dealers do not process or trade in illegally harvested fisheries resources.

1. Control of landed fish
2. Fish to be labeled with information of fishing area
3. Encourage the industry to improve traceability

None ____

ARTICLE 12 OF THE CODE OF CONDUCT – FISHERIES RESEARCH

26.	For how many stocks in your country have you obtained reliable estimates of the status of the stocks (e.g. biomass or state of exploitation) within the last three years?	**Number:** 20	
26.a	Please represent this as a percentage of the total number of stocks important to your national fisheries.	**Percentage**: 50	
27.	Is your country collecting timely, complete and reliable statistics on catch and fishing effort?	Yes	No
		X	
28.	Does your country have the qualified personnel needed to generate the necessary data to sustainably manage fisheries?	X	
28.a	**If no,** in what subject areas do you have the greatest need for additional qualified personnel?		

29.	Are the following used to provide data for the development of fisheries management plans?	Yes	No
	Catch and effort data from commercial and artisanal fisheries (small or large scale)	X	
	Research vessel surveys	X	
	On-board sampling from commercial vessels	X	
	In-port sampling surveys	X	
	Other – please specify		

30. Please identify key data gaps in managing your country's fisheries resources, along with measures taken to address them and constraints faced in that task.

Key Data Gaps	Measures Taken	Constraints
1. Leisure fishery	Questionnaire every 5th year	Can in some areas be as important as the commercial fishery, ie. Cod.
2. Fish that are not commercially important	In bycatch programmes and in pilot projects	Some species can be discarded and be heavily exploited.
3.		

31.	Is your country routinely monitoring the state of the marine environment?	Yes	No
		X	

31.a **If yes**, please briefly describe your efforts in this area.

This is routinely monitored by other bodies in our countries. The national Department of Fisheries measures mainly the state of the fish stocks in marine and freshwater areas.

32.	Is your country routinely monitoring bycatch and/or discarded species?	Yes	No
		X	

32.a **If yes**, please briefly describe your efforts in this area.

The national Department of Fisheries has a monitoring programme of bycatch and discard species in the most important fisheries in marine areas.

SUPPLEMENT C.

EXCERPT FROM A "CUSTOMIZED" SET OF GUIDELINES FOR GEODUCK AND HORSE CLAM FISHERIES IN BRITISH COLUMBIA, CANADA

Note:

The following excerpts show how the *Canadian Code of Conduct for Responsible Fishing Operations* is implemented in the geoduck and horse clam fisheries in British Columbia, through outlining how each of its principles and guidelines are incorporated into the fisheries. This self assessment was developed in consultation with geoduck harvesters and DFO fishery managers.

PRINCIPLE 1:
Fish harvesters will take appropriate measures to ensure fisheries are harvested and managed responsibly to safeguard sustainable use of Canada's freshwater and marine resources and their habitats for present and future generations of Canadians.

GUIDELINES:

1.1 Apply sustainable fishing principles and sustainable fisheries development to all aspects of fish harvesting and management of fisheries.

Geoduck and horse clam fishing enterprises are all full members of the Underwater Harvesters Association which co-manages the fishery in conjunction with Fisheries and Oceans Canada based on sustainable fishing principles. Geoduck is a long lived species of giant clam and is harvested at a conservative rate of 1% of initial biomass, which is in turn based on the conservative assumption that the rate of reproductive recruitment is 1%. In addition, there are significant stocks of geoduck which are not included in determining initial biomass, such as those geoducks below 60 feet where the present fishery stops (geoducks have been found to depths of 330 feet or more). Industry and DFO have also set aside many areas that are closed to commercial geoduck harvesting. These include three long term research plots, sensitive habitat areas for other animals, parks and university research closures.

1.2 Practice environmentally sound waste management in all aspects of harvesting operations.

There are presently 40 vessels fishing 55 licences in the B.C. geoduck and horse clam fishery. The vessels average 11.3 meters (37 feet) in length and are generally powered by diesel engines. Geoduck fishing operations comply with pollution requirements as set out by regulations under the Federal Canada Shipping Act and the Fisheries Act. Geoducks are transported live and therefore there is no processing on board, no fish or chemical waste, and no use of cleaning chemicals while harvesting. Geoduck and horse clams are filter feeders and can only be harvested from waters designated for shellfish under the Canadian Shellfish Sanitation Programme. It is in the best interest of geoduck and horse clam vessels to ensure that the waters in and around where they fish are as pristine as possible.

1.3 Optimize energy consumption in fishing operations where possible.

Energy consumption in geoduck and horse clam harvesting is confined to fuel use for transit to and from fishing grounds and fuel for the compressors which pump air to the divers under water. Once on the fishing grounds, vessels anchor while dive fishing is underway. Compressors are generally powered by the main vessel engine running at idle. In remote fishing areas, running times to and from the grounds are minimized by the use of packers which collect the day's catch and deliver it to the nearest landing port. Because the fishery is managed through an Individual Vessel Quota scheme, harvesting tends to be done in such a way to maximize value and minimize costs – the use of fuel, being one of those costs, is generally minimized within the context of a profit-maximizing enterprise.

1.4 Adopt practices that would minimize emissions of dangerous substances arising from harvesting operations to meet national standards.

Geoduck harvesting vessels are relatively small (avg. 37 feet) and have fairly limited potential to create emissions of dangerous substances. There are no recorded instances of a geoduck harvesting vessel receiving enforcement action for release of harmful substances. The UHA has provided presentations and information on vessel sanitation procedures and requirements to its members to make sure that the use of cleaning agents (such as bleach) are correctly applied and will not harm the environment. In addition, the UHA has encouraged all its members to make sure they have properly working carbon monoxide sensors in their vessels to avoid CO poisoning.

1.5 Establish fisheries policies in full consultation with management and other regulatory agencies to ensure conservation of fish resources and protection of the environment.

All licence holders in the geoduck and horse clam fishery are full members of the Underwater Harvesters Association which co-manages the fishery with Fisheries and Oceans Canada. As members of the association, individual enterprise heads participate in decision making through general meetings and area fishing committees. Communications with association members are ongoing through a monthly newsletter. The Association works directly with Fisheries and Oceans Canada, the Canadian Food Inspection Agency, and Environment Canada.

1.6 Recognize and support efforts to balance the economic needs of fish harvesters and industry with the short- and long-term needs of resource sustainability.

The UHA's primary mandate is to work on behalf of the commercial geoduck and horse clam fishery to further the interests of the industry within the context of resource and environmental sustainability.

1.7 Work in full consultation with management, other regulatory agencies, and all interested groups to consider the possible introduction of marine protected areas.

The UHA, on behalf of its members, has been actively involved in consultation processes regarding the introduction of marine protected areas on the Pacific Coast. The UHA is a founding member of the B.C. Seafood Alliance, an organization of seafood producing organizations. The Seafood Alliance has taken the position that, in principle MPA's are a good idea, but they should be based on sound science and solid information with clear objectives and implementation plans to make achievement of those objectives feasible.

PRINCIPLE 2:
Taking into account the economic importance of the fisheries to industry participants and their communities, fish harvesters will take appropriate measures to pursue the ecological sustainability of Canadian fisheries.

GUIDELINES

2.1 Develop protocols (including, when practical and appropriate, the use of selective fishing gears and practices) regarding the catch of non-targeted resources which jeopardize the health of the stocks.

Geoduck are harvested one at a time and by hand, by divers using "stingers" which are long thin high pressure water jets to loosen the sand around the clam. The only other species that may be caught by harvesting with this method is horse clams, which are authorized for harvest under the same licence. The harvest of horse clams is less than 3% of the total harvest of geoducks each year and at that level is not a conservation concern.

2.2 Use only gear authorized for use in a particular fishery.

There is only one gear that effectively allows for harvest of geoduck by dive fishing. Therefore this is not an issue in the commercial geoduck and horse clam fishery.

2.3 Ensure fishing activities are not conducted in a fashion that would endanger fish stocks or the environment.

Geoduck and horse clam fishing are only authorized at depths deeper than 3m (10 feet) below chart datum. This is specifically to avoid harvesting in eelgrass beds, which are important to spawning herring. Geoducks are found in sand and mud bottoms and research on the harvesting method has shown that it has no long term effects on these substrates or the species that live there. Natural events such as tidal movement, ocean surges and storm events have far more impact on these types of substrates than hand harvesting by divers.

2.4 Conduct, in consultation with relevant sectors, research to assess fishing gears, and promote and utilize new fishing gears and practices which are consistent with sustainable fishing practices.

Not applicable in the geoduck and horse clam fisheries where the only known alternative would be dredge fishing, which has a much greater potential to negatively affect the ocean floor and the selectivity of harvest.

2.5 Assist, initiate, and participate in research and assessment initiatives aimed at resource and environmental protection.

The UHA dedicates substantial financial and in kind resources to research aimed at ensuring a sustainable fishery. In addition, the UHA spends approximately $100,000 each year on water quality studies – which includes financing one full time position at Environment Canada. The UHA is consistently involved in commenting on proposals and projects which may affect water quality – since, in order to meet the standards of the Canadian Shellfish Sanitation Programme, the water quality where geoducks are harvested must be maintained at a high level. Furthermore, the UHA fully finances an experimental programme of geoduck enhancement which has the objective of planting 1 million juvenile geoducks back into the ocean floor each year. This programme has been in place since 1995 and is at the forefront of shellfish enhancement programmes in Canada.

2.6 Employ fishing practices that minimize the risk of gear loss.

Gear loss is not an issue in the geoduck and horse clam fishery – the equipment is specialized, hand carried by divers and attached at all times to the vessel. There is no record of any gear being “lost” and even if it were, the equipment is not capable of “ghost” fishing or harming the environment.

SUPPLEMENT D.

QUESTIONS TO CONSIDER WHEN PLANNING AND IMPLEMENTING FISHERY RECOVERY ACTIONS

Note:

From a review by Caddy and Agnew (2004), the following considerations seem relevant when planning a stock recovery process for a depleted population, and were presented in that report under five major headings:

A. Actions prior to the recovery process

B. Issues to be considered by the recovery team

C. Recovery objectives

D. Recovery management

E. After recovery

The following questions (and clarifications in italics) are based on the suggested provisions in the above report:

A. Actions prior to the recovery process:

1) Have the recovery objectives and strategies been spelled out in overriding legislation which specifies the values of indicators corresponding to limit reference points which mark a dangerously depleted stock and/or one being overfished?

2) Does the overriding legislation/regulations specify obligatory actions to take when stocks are depleted, including the reference points to be met during rebuilding?

3) Do associated monitoring procedures specify the precision required from population indicators used to establish whether the recovery is on track, or has a high probability of meeting its target?

4) Has a statistically verifiable end-point for stock recovery been defined in terms of indicator values or an unambiguous 'endpoint decision rule' been established in a statistically valid fashion?

5) Have a likely range of recovery periods and trajectories been simulated without necessarily stipulating in advance a fixed recovery duration.

6) Have formal reviews been anticipated at intervals to assess the progress of the recovery plan?

7) Is the recovery plan a public document, and has consensus has been sought through negotiation with stakeholders with input from all interested parties?

8) Has the fishing industry been incorporated into decision-making, planning and monitoring activities to ensure they are aware of the objectives and progress with the plan?

9) Have potential area/gear/interactions and supplementary technical measures such as closed areas in legislation been incorporated within the plan?

10) Have supplementary measures such as area restrictions, closure of critical habitats, nurseries or spawning areas, or the use of rotating harvest schemes been incorporated in the recovery plan, in order to provide necessary redundancy to measures centred on effort or catch control?

11) Are the targets and the strategy for rebuilding achievable, taking into account possible changes in climatic regime and accompanying levels of recruitment to the stock?

12) Have models of rebuilding taken into account a range of reasonable scenarios, especially for recruitment and environmental conditions?

13) Have the likely outcomes and risks involved with various decision strategies been evaluated using realistic estimates of survey, assessment and indicator precision and/or bias?

14) Have the mechanisms by which the recovery trajectory will be achieved (*inter alia*: capacity control, closed areas, quotas, effort, by-catch and area restrictions, gear/vessel restrictions etc), been specified, so as to ensure a necessary redundancy of measures?

15) Is recruitment strength being assessed?

16) Given that good year classes are infrequent and improved catch rates may attract new entrants and compromise completion of the plan, have reductions on fishing effort after better-than-expected recruitment years been resisted?

17) Are concentrations of recruits and pre-recruits protected from exploitation, in such a way that a) discarding is discouraged, b) juvenile concentrations are avoided, and c) undue damage to juveniles and critical habitats from repetitively fishing, avoided?

18) Have harvests of associated resources which take the depleted resource incidentally as by-catch been restricted?

Long time lags typically occur before assessments are translated into management action, but rebuilding procedures require rapid, non-discretionary responses to changes in indicator values.

19) Has adequate funding been set aside for all aspects of the recovery plan, including a monitoring control and surveillance programme, and as appropriate, a search for alternative resources or livelihoods, or special funding for retraining fishers displaced from the fishery by the recovery plan, and for vessel repurchase and scrapping costs as appropriate?

20) Is misreporting of catches, quota overruns and juvenile discarding or high grading given priority from MCS capabilities?

21) Have habitat requirements, breeding and nursery seasons and critical habitats, and environmental/ anthropogenic impacts on the target resource been established?

22) Has the carrying capacity of critical habitats been restored, protected or enhanced where this is feasible?

23) Has there been rebuilding of critical habitats or the closure of nursery areas and spawning refugia, as a pre-requirement for rebuilding?

24) Is the rebuilding plan precautionary with respect to errors and biases in indicators, analyses and modelling approaches used?

If biomass and/or fishing mortality can only be estimated with low confidence, targeting a fishing mortality rate by quota control is a risky strategy. A low fishing effort level or a constant low TAC including all by-catches, should be set, such that the fishing mortality rate has a low risk of exceeding the natural mortality rate.

Given that controlling fishing mortality rate indirectly through a quota is an imprecise mechanism at low stock size, another option is to aim for a low, constant fishing mortality directly. This may be achieved by a limited 'sentinel fishery' limited to a specified number of fishing days on agreed fishing grounds by vessels of known fishing power and gear characteristics. If after a few years a recovery strategy is unsuccessful, all fisheries taking the depleted stock should be closed.

25) Are observers present on fishing boats, and is the requirement to land all catches of the recovery species imposed?

26) Is background information collection and research carried out to establish the impact of changing environmental conditions and fluctuations on stock-recruit relationships?

27) Is the ecological and genetic status of the stock, and the stock status of other associated resources, including predators and preys known?

28) Is there a programme of public outreach and education to explain the need for a stock recovery plan?

29) Have protocols for intensive data collection, sampling and indicators of stock condition been established?

30) Are multiple indicators (such as condition factor, mean age in the population, distributional extent, etc), being monitored as measures of variable resource productivity so that the following questions can be answered:

- are we in a favourable or unfavourable regime?

- has there been a radical change in the ecosystem that might lead to a change in carrying capacity of the ecosystem for the species in question?

31) Has the current stock status been compared, not just with recent stock trajectories, recruitments and the stock-recruit relationship, but also with historical biomass levels prior to industrial exploitation?

32) Has excess capacity been removed from the fishery early in the recovery period?

B. Issues to be considered by the recovery team:

A recovery team made up of interest groups, scientists and managers is needed to decide on a programmed approach and oversee implementation of the recovery plan.

In developing a recovery plan has the recovery team taken into consideration the following issues:

33) Are surveys or other sources of fishery-independent information on stock size and productivity changes providing adequate data? Or is there a dependence on using retrospective analysis from catch data for making management decisions?

34) Is a pre-negotiated management procedure being applied, requiring non-discretionary actions when pre-established limit reference points in the recovery rule are approached?

35) Have management procedures or quota change rules been built into the underlying legislation/regulations, into the management infrastructure and the annual (or better, semi-annual) decisional cycle?

36) Do indicators monitored contain information on ecosystem, habitat, spatial distribution, condition factor, environment and productivity, as well as relevant socio-economic and data?.

37) Are decision points in the plan determined by the return of the stock to predetermined levels?

38) Is an appropriate and timely decision-making and consultation infrastructure in place to implement the rebuilding plan?

Although premature opening is not compatible with stock recovery, if a small quota is allocated for monitoring purposes, it should ideally incorporate industry test fishing. Test fishing should aim to provide indicators of stock size based on contraction or expansion of species ranges and stock presence at former hot spots.

Especially where indicator data are imprecise and possibly biased, a quota management rule (for catches or days fished) may be necessary, incorporating an 'inverse ratchet': such that quota increments are small when conditions are 'green' or favourable, but more radical cuts are made when poor conditions and 'yellow or red' indicators are registered.

Avoid complete dependence on hatcheries for restocking: be aware of the risk of genetic contamination to the wild stock if hatchery brood stock is not selected carefully, and for narrowing of the genotype if only a limited brood stock is used.

C. Recovery objectives:

39) Has an "end-point" for complete recovery well above the biomass-based LRP that triggered the recovery plan, been specified?

40) Has the plan end point been defined in terms of spawning biomass and possibly age composition taking into account estimation error and data bias, and does it relate to pre-exploitation levels?

41) Have the impacts of environmental and ecological uncertainties on recovery been taken into account at the start of the plan in suggesting a tentative recovery period?

42) Has a strategy for arriving at the recovery target been defined: whether constant F or constant catch or some other approach?

Define what approach to take to inevitable deviations from the most probable trajectory. Recall that 'tuning' fishing mortality rate is very vulnerable to changes in availability and recruitment. Experience and simulations show that speedy recovery depends on choosing a low initial exploitation rate, and that frequent "re-tuning" of the exploitation strategy can be counterproductive.

43) Has the assumption that spawning compensation for low stock size will always occur, and that future recruitment levels will resemble those in the immediate past?

Hence, defining a time period for recovery to the biomass target can only be uncertain, since it depends on recruitment, which is an uncertain function of environmental and ecological conditions as well as biomass. In addition to setting a final target biomass, it may be wise to set a series of progressively larger interim biomass targets for each phase of the rebuilding plan with flexible timing.

44) If a constant exploitation strategy is used, has care been taken to avoid using 'windfalls' from better-than-average recruitment to justify temporary increases in catch during the rebuilding plan?

Such a strategy is short sighted, since good recruitment will often be infrequent. Rapid rebuilding requires making best use of them. Contrariwise, it will be politically difficult to reduce a small quota below the summed by catch in other fisheries when inevitable 'shortfalls' arise, since this will require closing or restricting other fisheries.

45) In addition to a primary target of rebuilding spawning biomass, does the plan give priority to rebuilding older age groups in the population?

With potential ages of some demersal fish of up to 12 years, expecting more than two good year classes to consistently occur in a restored population is optimistic, given typically irregular recruitment. One consequence of this is that there is never a justification for a return to 'routine' equilibrium production strategies: the stock will always face the risk of further collapses. For intermittent or spasmodic stocks, year class variations are strongly tied to environment as much or more as stock size – here, the stability hypothesis should be avoided. Recognize that duration of recovery is largely environmentally determined and hence uncertain.

46) Has account been taken for mixed species fisheries, that rebuilding one stock inevitably affects others, providing a strong incentive for selective fishing?

47) For mixed species fisheries, have consultations been encouraged between users of resources other than that being rebuilt, on the impacts of the rebuilding plan on the utilization of the other resources?

D. <u>Recovery management:</u>

Necessary actions must be specified if recruitment varies from predicted conditions. As in the Striped Bass case, if a very good year class enters the population during rebuilding, ideally, its survival should be improved by special measures until it has been in the spawning population for several years.

Ensure that decisions required by the recovery plan as indicator values approach target RPs for biomass, are not delayed by consultation. Once the plan is agreed, streamlined implementation by the recovery team is needed, with authority to apply the decision rules with minimal interference. Ensure that all concerned understand the criteria for assessing progress along the recovery trajectory, and what should happen when the plan reaches its end point.

48) Has consideration been given to multi-species and multi-gear interactions that may undermine the effectiveness of the plan and its ability to meet targets, including the effect of by-catch and discarding?

A rebuilding plan involving multi-gear fisheries and multinational fleets for mixed species poses complex problems. This requires prior agreement on how the inevitable restrictions on landings of species not the target of recovery are apportioned between users.

49) Has a monitoring, control and surveillance programme involving the fishing industry been designed that provides incentives rather than just disincentives?

50) Are MCS activities and data gathering being coordinated and voluntary compliance encouraged by involving fishers and industry to engage in survey and monitoring?

51) Have procedures been agreed for allocating catch reductions or fleet cutbacks where different fleets/countries harvest a common stock?

52) Has more than one indicator or test statistic to be satisfied before the recovery plan can be terminated?

Test criteria for terminating the plan may be expressed in both spawning biomass, the abundance of older fish, or evidence that recruitment is satisfactory in the year that the other two criteria are satisfied.

E. <u>After recovery:</u>

53) Have all post-recovery issues been considered before the stock approaches its recovery target?

This is when the political pressure to resume large-scale fishing will be greatest. Problems that led to past overfishing during 'routine management' need to be corrected before the end of the plan. When rebuilding is almost accomplished, decisions should already have been made on the following 'routine' exploitation strategy, to ensure that depletion is not repeated in the future. A revised approach to management should be considered before the end of the recovery plan, such as the move to an ITQ system or a change to a more selective fishing strategy. Avoid antagonizing existing stakeholders by allocating new licenses or access rights after recovery.

54) Have components of the rebuilding plan been incorporated into a precautionary framework for the rebuilt stock, recognizing that irregular recruitment and overshoot of sustainable harvests will still occur?

For stocks with notably irregular recruitment (and for most depleted stocks) good year classes are few and far between. This leads to the prospect of an indefinitely repeated series of recovery plans, and the recovery plan for irregular species should be incorporated into the routine management plan for the stock, such that a return to 'fishing as usual' may not be the optimal strategy. A reduced fleet capacity should apply in the recovery period and when stocks are low.

SUPPLEMENT E.

EXTRACTS FROM THE SCORECARD PROPOSED FOR THE INTERNATIONAL CORAL REEF INITIATIVE (ICRI)[24]

Rating Table

Part I: Coastal Management
This part is intended to assess the coastal management strategies and interventions the country's National Coral Reef Initiative (CRI) has undertaken to conserve and manage their coral reefs. The criteria reflect the Coastal Management measures endorsed by the "Call to Action", which are: • Incorporate integrated coastal management measures into local, national, and regional development plans and projects and support their long-term implementation. • These measures will serve as the framework for achieving the sustainable use of, and maintaining the health of, coral reefs and associated environments. • Develop coral reef initiatives (regional, national and/or local). These should use an ecosystem-based, integrated approach that encourages participation and includes programmes for community-based management or co-management of reef resources.

National Coral Reef Action Plans	
4 points: The Plan has been endorsed and is under implementation 3 points: The Plan has been drafted, but has not yet been endorsed and implemented 2 points: A draft Plan is being developed 1 point: Discussions regarding the development of a plan are in progress 0 points: A National Coral Reef Action Plan is not being discussed or planned *Additional points (add 2 points if the Plan addresses the first item and any others):* • reflects ICRI's four objectives (integrated management; capacity building; research and monitoring; and review) and agreed regional priorities • pro-actively engages industry (e.g. tourism, fisheries) • vertically links international and local stakeholders • identifies actions and improves capacity at the national level that will allow implementation of international treaties and programmes (e.g. regional seas) • supports local community management	**Your score:**

Fisheries Management	
3 points: fisheries restrictions (e.g. quotas on catch or number of boats, limits on types of fishing) are effective in ensuring fishing activities are sustainable 2 points: restrictions are moderately effective in ensuring fishing activities are sustainable 1 point: restrictions exist, but are largely ineffective in ensuring fishing activities are sustainable 0 points: there are no restrictions on fishing activities -1 point: sectoral policies promote destructive fishing practices or overcapacity (e.g. subsidies to the fisheries sector)	**Your score:**

[24] ICRI GM (1)2004/10.3. International Coral Reef Initiative (ICRI) General Meeting, Okinawa, Japan, 3-4 July 2004

Management of Diving and Snorkeling Activities	Your score:
3 points: management measures (e.g. talks on boat, ban on taking pieces of coral, moorings in place) are effective in ensuring diving and snorkeling activities have minimal impacts on the reefs 2 points: management measures are moderately effective in ensuring diving and snorkeling activities have minimal impacts 1 point: management measures exist, but are largely ineffective in minimizing the impacts of snorkeling and diving 0 points: there are no management measures to minimize the impacts of diving and snorkeling activities on the coral reefs -1 point: sectoral policies promote tourism over conservation objectives, resulting in additional threats to coral reefs, (e.g. tourism promotions for tours featuring swimming with dolphins.]	

Enforcement	Your score:
3 points: Law enforcement capacity is excellent for all activities threatening the reefs 2 points: Law enforcement capacity is acceptable, but some deficiencies are evident for some of the activities threatening the reefs 1 point: There are major deficiencies in law enforcement capacity for most of the activities threatening the reefs (i.e. staff lack skills/equipment, monitoring and surveillance capacity is low, problems with legal processes) -1 point: There is no effective capacity to enforce coral reef legislation and regulations	
Legislation	**Your score:**
2 points: Legislation and regulations are effective in achieving coral reef protection and management objectives 1 points: Legislation and regulations are somewhat effective in achieving coral reef protection and management objectives 0 point: Legislation and regulations are ineffective in achieving coral reef protection and management objectives -1 point: Problems with legislation or regulations represent a major barrier to achieving coral reef protection and management objectives	

Incentive Programmes	
2 points: Incentive programmes are effective in getting people to switch from destructive to non-destructive practices 1 point: There are incentives for people to switch practices (e.g. alternative livelihood training, subsidies, tax incentives); however, these measures are not sufficient to achieve coral reef protection and management objectives 0 points: There are no incentives for shifting from destructive practices to non-destructive practices	**Your score:**
TOTAL Part I	

Part II: Capacity Building

This part is designed to address the governance aspects of the coral reef initiatives, including the training, resource, tools, and financial aspects. The criteria reflect the Capacity Building measures endorsed by the "Call to Action", which are:

- Establish regional networks to share knowledge, skills, and information
- Develop and support educational and informational programmes aimed at reducing adverse impacts of human activities
- Establish information exchanges with stakeholder communities
- Improve developing nations' access to bilateral, multilateral, and other forms of financial and technical support for coral reef management

Financial Sustainability	**Your score:**
3 points: The available budget is sufficient and meets the full management needs of the coral reef initiative 2 points: The available budget is acceptable, but could be further improved to fully achieve effective management 1 point: The available budget is inadequate for basic management needs 0 points: There is no budget for the coral reef initiative *Additional points (add 1 point for each):* • the budget is allocated for multiple years, rather than depending on annual allocations • financing is based on multiple sources (e.g. government funding, NGO contributions, private sector contributions) • economic instruments are being employed to support the CRI (e.g. user fees, green taxes, trust funds)	
TOTAL Part II	

Part IV. Review

The objective of this component is to assess the adequacy of coral reef action plans, to identify gaps or interventions/policies that need strengthening, and to identify those actions which appear to be highly effective and should be replicated and/or taken to scale. The criteria reflect the Review measures endorsed by the "Call to Action", which are:

- Periodically review the extent and success of implementation of actions identified in the initiative.

Evaluation	**Your score:**
4 points: Coral reef conservation and management interventions are comprehensively monitored and assessed on a regular basis and the results are incorporated into decision support to improve policies and update action plans 3 points: Coral reef conservation and management interventions are comprehensively monitored and assessed on a regular basis, but the results are not incorporated into decision support tools to improve policies and update action plans 2 points: Coral reef conservation and management interventions are comprehensively monitored and assessed on a semi-regular basis 1 point: Evaluations of specific interventions are ad hoc 0 points: Coral reef conservation and management programmes are not evaluated *Additional point (add one point):* • Results are widely accessible to the public	
TOTAL Part IV	
TOTAL SCORE	

SUPPLEMENT F.

EXTRACT FROM A HYPOTHETICAL RESPONSE TO A QUESTIONNAIRE BASED ON EVALUATING PERFORMANCE OF NATIONAL RESEARCH INSTITUTES TO ARTICLE 12 OF THE CODE OF CONDUCT

Note:

The hypothetical data is intended to provide ideas on how to use the Code questionnaires to evaluate coverage of fisheries research performance by a research Institute, specifically in relation to Article 12. The column labelled "Entity" indicates whether compliance with a particular Article 12 clause is recognized as the responsibility of Government (G) or falls within the research institute's (R) terms of reference.

Article	Question	Entity	Score
12.1	Is appropriate research being conducted into: biology (2.5) ecology (2) technology (2) environmental science (2) economics (1.5) social science (1.5) aquaculture (2.5) nutritional science (2) ***Response:*** A breakdown of the publications shows that a significant production of research output in all of the above fields is being achieved. An analysis of whether this research is appropriate would require a more explicit prioritization of their requirements by the resource users. It is suggested that a priority be given to providing a synthesis of the current status of research in each field, with particular emphasis on describing the drawbacks or information gaps that need priority attention by researchers in each field. The above breakdown suggests that the large majority of published results are in the field of fishery biology, but apparently only a smaller proportion of these are on quantitative aspects of fish assessment normally required by fishery managers. ***Suggestion to the committee*:** Evidently, not all areas of specialization mentioned above are of equal priority to fishery managers, nor does the number of papers published necessarily reflect the investment made in each academic speciality. It would nonetheless be useful to solicit from government managers a list of current areas of concern, with priorities, to compare this with the published output.	R,G	16/24

Article	Question	Entity	Score
12.1	Are research facilities available? (2.5) ***Response:*** In general, the answer to this question is positive, with several institutes set up around the littoral which are dedicated in whole or in part to solving fishery and/or aquaculture problems.	G	2.5/3
12.1	Is there appropriate training available nationally in fishery-related subjects? (2.5) ***Response:*** Several universities provide training in various disciplines related to fisheries research, and most institutes provide on the job training for new staff, or have staff who also are professors at local universities. (It would be useful to have some statistics of staff with split terms of reference between institutes and research laboratories?) ***Suggestion to the committee:*** It seems that few courses of advanced training in the fields of concern to fisheries management and research are available nationally. Nor is there evidence that incentives are provided to staff of research institutes to take leave of absence for specialized training or retraining.	G	2.5/3
12.1	Is the staffing of these institutes appropriate to provide for the needs of fisheries advice? (2). ***Response:*** While several small subregional laboratories with few specialists in each has the advantage of ensuring a familiarity with local conditions, but this means that there is no critical mass of experts in any one location to provide the collegial discussion needed. This will lead to problems, e.g. when research review and editing of publications is required. It also makes standardizing research approaches through national waters difficult. ***Suggestion to the committee:*** Attempts have been made to assign lead roles to senior staff in specific areas, and to a certain extent this has been successful, although it is not always clear whether the assignment reflected seniority or some especial training or aptitude in the area concerned. What would seem desirable is to look at the possibility of national working groups meeting regularly (e.g. on stock assessment) to exchange views and results. The problems of numerically-intensive research such as statistical analysis, computer back-up, stock assessment, population modelling, etc., need special mention where staff training is concerned. Here staff need to take specific training or post-graduate courses in areas such as population modelling, and a sabbatical leave provision is one useful approach to this. Review the staff hiring policies and recent records of exchanges of staff between different national institutes, and also with those abroad.	G	2/3

Article	Question	Entity	Score
12.1+12.2	Is the institutional structure of national research facilities appropriate for providing such advice? (1.5) ***Response:*** As mentioned above, there are problems due to the localisation of research advice in regional centres. In addition to those reasons provided above, there are at least two other specific problems: a) The size and distribution range of many of the fish stocks may be such that a single stock occupies the jurisdictional area of more than one laboratory. This problem requires a cooperative approach, and it may be more efficient in avoiding research duplication if one or more species groups of wide range and importance are handled by a single team given national jurisdiction? b) Although regional laboratories provide locally-relevant advice, management implementation (with a few exceptions like some local shellfish fisheries) seems to be largely national. It is beyond the consultant's personal experience to say that this is a major problem, but should be considered in the context of locally-defined user rights. ***Suggestions to the committee:*** Examine the current flow of information and advice from the research sector to the fisheries managers. Who are the users of research advice? What proportion of research advice offered is acted upon? What requests for advice are received by researchers and via what route do these requests arrive? Could a more streamlined and effective routing be arrived at within the current system?	G,R	1.5/3
12.3	Are the data generated by research being analysed? (1.5) ***Response:*** It seems unlikely that the situation is much different here than elsewhere: the increased rate of accumulation of relevant data and its storage in extensive data storage facilities represents a problem, and it is inevitable that much data collected semi-automatically on environment and resources are probably not being analysed. The massive input of information from regular trawl surveys means that a substantial component of this information is not worked over in depth, and it is doubtful that an overall picture of ecosystem changes can emerge this way. Putting the data into the public domain after a reasonable number of years have passed and the originators have had the priority opportunity to use it for their purposes, seems the ideal way to go. ***Suggestion to the committee:*** A key question could be asked whether publicly-sponsored research data should remain in the hands of a few scientists once the immediate research aims have been fulfilled, after which, the question is, when and how should it be made available to universities and industry in the public domain? How many years should pass before publicly funded (raw or summarized) data are made public? Should there be a government site on the internet for this purpose?	R	1.5/3

Article	Question	Entity	Score
12.3	Are the results of research being published? (2) ***Response:*** Many reports are coming out in the national language but a small proportion of these are reaching the international literature. Especially in Aquaculture, the trend seems to produce reports of immediate applicability to the industry. On the marine fisheries management side, there has until recently been the tendency to focus research on a species by species basis, without so much attention to immediate management applications, or on multispecies questions. This may have been inevitable as stock assessment research has intensified since the 1970's, but could also be due to a lack of specific questions from management. Could it also be that in the past there is inadequate commitment to science-based management on the part of managers? ***Suggestion to the committee:*** What is the main obstacle to improving publication performance of staff? Does publication performance determine in any way career success? Are there other incentives that could improve publication performance?	R,G	2/3
12.3	Is confidentiality of data, where appropriate, being respected? (3) ***Response:*** This appears to have been the case where catch data from individual boats appears to have been merged into larger geographical categories before publication. ***Suggestion to the committee:*** Are there risks that information provided by fishermen or processors could be used by the fiscal authorities for civil or criminal proceedings? If so, there will be an incentive to misreport data.	R,G	3/3
12.3	Are the means available for distributing/disseminating research advice where appropriate? (2). ***Response:*** A number of publication outlets in the national language are evident from the list of papers provided, though in many cases the reports are not in the form of advice that can be easily understood by non-professionals. Nor from reading the titles of the research, does the report always seem to be aimed at solving problems faced by fishery managers. ***Suggestion to the committee:*** An intermediate step is needed between the research results published in a scientific journal, involving their reinterpretation as management advice in simple and clear language. Are there national procedures for providing the media with clear and unambiguous information on the research being implemented?	R	2/3

Article	Question	Entity	Score
12.3 +12.4	Is the advice provided in a timely fashion? (2) ***Response:*** It is the consultant's impression that immediate descriptive studies based on data collected are released fairly promptly. In depth analyses seem to be delayed on a number of topics, especially those requiring interdisciplinary aspects. As noted before, for scientists to provide advice promptly, there needs to be a management cycle with a 1 or 2 years institutional reporting structure. This may exist but it is not obvious at the national level. It would help in involving scientists and fisheries managers in working in close liason, e.g. through a committee or regular seminar series? ***Suggestion to the committee:*** It is suggested to compare for a sample of published papers, the dates of research funding and data collection with the final dates of publication.	R,G	2/3
12.3	Is the advice presented in a form that is readily understood (by laymen)? (2) ***Response:*** The informational structure of popular national publications on aquaculture and on sports fishing exist, and should facilitate the process of popularizing news items. In the national press however, fisheries related stories are not common, nor do they seem to present an informed and scientifically-relevant aid to popular understanding in many cases. ***Suggestion to the committee:*** Is there a need for a press office in the national fisheries authorities charged with providing objective news stories to the media?	R,G	2/3
12.3	Is appropriate new research initiated as soon as possible once a need is evident for advice in this area? (2.5) ***Response:*** Individual national scientists are rapid in picking up on new research themes and problems, but is the funding needed to make major progress in new areas provided? ***Suggestion to the committee:*** What are the constraints placed on national institutes taking up new research themes, and how can these constraints be overcome? Increased funding? Retraining of staff scientists? Greater access to national laboratories by visiting investigators?	R,G	2.5/3

FAO FishCode Reviews

1 Pintz, W.S. Tuna and bottom fishery licence management: Tonga. *FAO/FishCode Review*. No. 1. Rome, FAO. 2003. 35p.

Fish are now the largest single export from the Kingdom of Tonga. However, expansion of the industry faces severe infrastructure constraints, and granting substantial numbers of new longline licences without resolving the constraints could seriously affect all Tongan commercial fisheries.

2 Gillett, R. Aspects of fisheries management in the Maldives. *FAO/FishCode Review.* No. 2. Rome, FAO. 2003. 61p. (*Restricted distribution)*

The inshore marine resources of the Maldives, an atoll environment, are being increasingly exploited for baitfishing, food for local residents, consumption by tourists, exports and non-extractive uses such as dive tourism. This situation must be reconciled with the limited nature of the resources.

3 Die, D.L.; Alió, J.; Ferreira, L.; Marcano, L.; Soomai, S. Assessment of demersal stocks shared by Trinidad and Tobago and Venezuela. *FAO/FishCode Review*. No. 3. Rome, FAO. 2004. 32p.

The FAO/WECAFC Workshop on assessment of demersal stocks shared by Trinidad and Tobago and Venezuela (2002) initiated an assessment of the shrimp stocks shared by the two countries. The main conclusion of the assessment is that some shrimp stocks are being severely overfished and are suffering as a result.

4 Gillett, R. The marine fisheries of Cambodia. *FAO/FishCode Review.* No. 4. Rome, FAO. 2004. 57p.

Excess fishing effort and associated declines in abundance of target species are the most serious problems facing Cambodia's marine fisheries: resource sustainability will require restrictions on resource access.

5EN FAO/FishCode. Seminar on responsible fisheries management in large rivers and reservoirs of Latin America. *FAO/FishCode Review*. No. 5. Rome, FAO. 2004. 72p. [En]

This report of the Seminar on Responsible Fisheries Management in Large Rivers and Reservoirs in Latin America (2003), attended by experts from member countries of the Commission, observers from other regional bodies and representatives from local fishing communities in El Salvador, presents the principles of responsible fishery management in Latin America as well as a selection of national reports.

5SP FAO/FishCode. Seminario sobre ordenación pesquera responsable en grandes ríos y embalses de América Latina. *FAO/FishCode Revista.* No. 5. Roma, FAO. 2004. 78 p. [Sp]

El Seminario sobre Ordenación Pesquera Responsable en Grandes Ríos y Embalses de América Latina (2003) se efectuó en San Salvador en asociación con la novena reunión de la Comisión de Pesca Continental para América Latina (COPESCAL). Participaron expertos de países miembros de la Comisión; observadores de otros organismos regionales y representantes de comunidades pesqueras locales de El Salvador. Se presentaron dos documentos sobre los principios de la ordenación pesquera responsable en grandes ríos y embalses en América Latina y una selección de informes nacionales.

6 Swan, J. National Plans to combat illegal, unreported and unregulated fishing: models for coastal and small island developing states. *FAO/FishCode Review.* No. 6. Rome, FAO. 2003. 76p.

These case studies for use in FAO regional and subregional workshops were prepared in accordance with the FAO International Plan of Action to Prevent, Deter and Eliminate IUU Fishing. The "Republic of Galactia" and the "Alpha Islands" are fictitious, but the fisheries profiles presented draw on typical existing circumstances.

7 Kuemlangan, B. Creating legal space for community-based fisheries and customary marine tenure in the Pacific: issues and opportunities. *FAO/FishCode Review.* No. 7. Rome, FAO. 2004. 65p.

The laws of Pacific Island countries generally support traditional fisheries management with only modest efforts to encourage the use of customary marine tenure-based community fisheries management. Government commitment for the role of customary marine tenure in community-based fisheries management, with support from interested stakeholders, will complement efforts for promoting sustainable utilization of fisheries resources and improved livelihoods in the Pacific region.

8 FAO/FishCode. Report of the Workshop on Development of a Management Plan for Tomini Bay Fisheries, Indonesia. *FAO/FishCode Review.* No. 8. Rome, FAO. 2004. 31p.

Tomini Bay fishery resources are still considered to be underexploited, but annual catches have increased dramatically over the past ten years. In the absence of a fisheries management body, The FAO/Government of Indonesia Workshop on the Development of a Management Plan for Tomini Bay Fisheries (2003) provided a starting point for addressing responsible fisheries issues and laying the groundwork for a fisheries management plan

9 FAO/FishCode. Report of the National Conference on Responsible Fisheries in Viet Nam, Hanoi, Viet Nam, 29–30 September 2003. *FAO/FishCode Review.* No. 9. Rome, FAO. 2004. 94p.

This national conference was organized in the context of increasing problems faced by Vietnamese fishers in maintaining and improving their livelihoods through coastal and offshore fisheries; some coastal fish resources in particular are being heavily over-exploited.

10 Stanley, J. Institutional review of the National Fishing Corporation and the Fisheries Department of Tuvalu. *FAO/FishCode Review.* No. 10. Rome, FAO. 2004. 47p. (*Restricted distribution)*

The economic growth and development of Tuvalu depend on its marine resources and especially its relatively rich tuna resources. Although the primary concern of the government is the sustainable economic development and management of tuna, there is also potential for the development of other marine products, particularly deep bottom fish.

11 García Mesinas, A. Lineamientos para un Código de Ética de Pesca y Acuicultura para El Salvador. *FAO/FishCode Revista.* No. 11. Roma, FAO. 2004. 59p. [Sp] (*Restricted distribution)*

Este documento presenta los resultados de un proyecto llevado a cabo a través del Programa FishCode de la FAO a petición del Gobierno de El Salvador para desarrollar los lineamientos a nivel nacional del Código de Ética de la Pesca y Acuicultura. El trabajo se realizó coordinado a través de la Oficina Regional de América Latina (RLC) y la Representación de FAO de El Salvador.

12 FAO/FishCode. Report of the National Workshop on the Code of Conduct for Responsible Fisheries and its practical application to coastal aquaculture development in Viet Nam. *FAO/FishCode Review.* No. 12. Rome, FAO. 2004. 47p.

The National Workshop on the Code of Conduct for Responsible Fisheries and its Practical Application to Coastal Aquaculture Development in Viet Nam took place in Hué from 3 to 4 October 2003. The Workshop aimed to build awareness among national and provincial stakeholders about the need to develop and implement an Aquaculture Code of Conduct for Viet Nam. Coastal aquaculture in Viet Nam, particularly shrimp culture, has developed rapidly in recent years. Although shrimp farming has brought many benefits to coastal communities, it is associated with high social and environmental risks.

13 FAO/FishCode. Report of the National Seminar on the reduction and management of commercial fishing capacity in Thailand. *FAO/FishCode Review.* No. 13. Rome, FAO. 2005. 59p.

The marine capture fisheries sector is more capital intensive than is appropriate for Thailand's resource endowment, and there is an urgent need for fishing capacity reduction for improved fisheries management and protection and conservation of fish habitats and other threatened coastal resources. Failure to achieve this will have serious consequences for the most vulnerable people in coastal communities, fish consumers and society at large.

14 FAO/FishCode. Reports of the regional vessel monitoring systems workshops: Southwest Indian Ocean, Central America, the Caribbean and Southeast Asia FAO/FishCode Review. No. 14. Rome, FAO. 2005. 91p.

Four regional workshops on vessel monitoring systems (VMS), respectively covering the South West Indian Ocean, Central America, the Caribbean and Southeast Asia, were organized and implemented in succession from September 2003 to October 2004. The workshops were intended to promote the use of VMS as an additional instrument for the management of fisheries, both at a national level and in cooperation with regional fisheries bodies. They comprise one aspect of FAO's larger set of activities to implement the International Plan of Action (IPOA) to Prevent Deter or Eliminate Illegal, Unreported and Unregulated (IUU) Fishing. The document includes a CD-ROM.

15 FAO/FishCode. Fishery policy in the Marshall Islands. *FAO/FishCode Review*. No. 15. Rome, FAO. 2005. 33p.

Fisheries play a key role in the economy of the Republic of the Marshall Islands (RMI) and in the lives of its people. Substantial tuna resources are exploited from the country's vast exclusive economic zone, largely by foreign fishing vessels operating under license. Coastal fisheries are important for subsistence purposes, and also generate income for atoll communities. RMI's well-recognized remote and pristine outer atoll lagoons are considered suitable for targeted commercial mariculture development. The Marshall Islands Marine Resources Authority is investing heavily in formulating its outer island work programmes, involving both coastal fisheries and mariculture research and development. A cautious and transparent approach is needed, with attention to partnerships between communities and private business concerns and the use of incentives involving seed funding, technical assistance, transport facilitation, and other support activities.

16 FAO/FishCode. Report of the Conference on the National Strategy for Marine Fisheries Management and Development in Viet Nam. *FAO/FishCode Review.* No. 16. Rome. FAO. 2005. 64p.

The Conference on the Strategy for Marine Fisheries Management and Development in Viet Nam, (Hanoi, 26 – 27 April 2005) was organized by the Ministry of Fisheries of Viet Nam (MOFI) in close collaboration with the Research Institute Marine Fisheries, the DANIDA Fisheries Sector Programme Support (FSPS) and the FAO FishCode Programme. It represented the culmination of a process that started in 2003 with the Conference on Responsible Fisheries in Viet Nam and that included a number of local level consultations as well as a senior expert meeting in 2004. The 2005 Strategy Conference was attended by a wide range of sectoral stakeholders, representing local and commercial fisheries interests, national and provincial government bodies, bilateral development assistance agencies and international organizations. Observations and recommendations received from the Conference have provided a basis for MOFI to finalize the Strategy for official Government approval.

17 Macfadyen, G.; Cacaud, P.; Kuemlangan, B. Policy and legislative frameworks for co-management. Paper prepared for the APFIC Regional Workshop on Mainstreaming Fisheries Co-management in Asia Pacific. Siem Reap, Cambodia, 9–12 August 2005. *FAO/FishCode Review.* No. 17. Rome, FAO. 2005. 51p.

This paper was prepared for the Asia-Pacific Fisheries Commission workshop on mainstreaming fisheries co-management, held in Cambodia in August 2005. It examines the policy and legislative frameworks for co-management in thirteen countries in Asia and the Pacific, and the extent to which these frameworks hinder or support co-management practices. The nature of policy and legislative frameworks is varied, as is commitment by governments to co-management – in some cases support is more rhetoric than reality, with insufficient real transfer of powers and financial resources to local levels. Through an analysis of the different case studies, "lessons learned" are presented and a number of conclusions drawn about the key characteristics of a supportive policy and legislative framework based on some ideas about "best practice." The adoption of these characteristics by governments would demonstrate their commitment to co-management and increase the likelihood of co-management success.

18 FAO/FishCode. Report of the Global Fisheries Enforcement Training Workshop. Kuala Lumpur, Malaysia, 18–22 July 2005. *FAO/FishCode Review*. No. 18. Rome, FAO. 2007. 66p.

The Global Fisheries Enforcement Training Workshop (Kuala Lumpur, Malaysia, 18–22 July 2005) brought together operational-level monitoring, control and surveillance (MCS) professionals for the global community who are dedicated to resolving illegal, unreported and unregulated (IUU) fishing issues. Hosted by the Government of Malaysia in cooperation with the MCS Network, the FAO FishCode Programme and the European Union, the Workshop provided participants with training on a wide range of MCS topics and gave them the opportunity to share information and experiences, latest developments and new ways to improve fisheries enforcement. Among other subjects, the Workshop reviewed enforcement techniques and MCS operations through individual presentations, case studies and panel discussions. Participants discussed a wide range of tools available to assist countries in dealing more efficiently with IUU fishing, as well as methods of applying these tools through legal systems.

19 Gillett, R. and Moy, W. Spearfishing in the Pacific Islands. Current status and management issues. *FAO/FishCode Review*. No. 19. Rome, FAO. 2006. 76p.

Spearfishing is growing in importance in the Pacific Islands. While its management has featured as a topic in some regional-level meetings, detailed information on spearfishing is surprisingly scarce. In early 1994, the Secretariat of the Pacific Community (SPC) proposed to consolidate information on spearfishing in the Pacific Islands. The original intent was to undertake a review of the available literature through a desk study. With the realization that many issues related to spearfishing are undocumented, the strategy was changed to include some field work. These activities were supported by the FAO FishCode Programme. This report reviews spearfishing in selected Pacific Island countries and identifies the important species caught by and the major problems associated with the method. It further considers possible interventions to mitigate these problems and the assistance that is likely to be required by Pacific Island countries in the management of their spearfisheries. For several reasons, a complete ban of scuba spearfishing coupled with effective enforcement is the single most important spearfishing management measure.

20 Wilkinson, S.; Collins, J. Information in support of responsible fisheries and aquaculture. Guidelines on digital publishing: a practical approach for small organizations with limited resources. *FAO/FishCode Review.* No. 20. Rome, FAO. 2007. 68p.

These Guidelines on digital publishing are targeted primarily at small organizations with limited resources in developing countries, in order to facilitate decision-making on how to publish and disseminate their information. The Guidelines are based on the years of experience of the Network of Aquaculture Centres in Asia-Pacific (NACA) and its partners. The approach is practical in orientation, covering topics including: (a) planning, building and maintaining a sustainable digital publishing system; focusing on a common scenario of setting up a Web site as a digital publishing platform; (b) producing user-friendly digital publications and making them accessible; (c) some recent international developments in digital publishing; and (d) recommended software tools and technical resources for further reading.

fishCODE

The FAO Programme of Global Partnerships for Implementation of the Code of Conduct for Responsible Fisheries

The 1995 FAO Code of Conduct for Responsible Fisheries (the Code) represents a consensus between countries as to the features that should characterize systems designed to ensure sustainable use of fishery resources. This report provides a series of questionnaires corresponding as closely as possible to clauses from Articles 7, 8, 9, 10, 11 and 12 of the Code, which can form the basis for a practical method of evaluating compliance of national or local fisheries with its provisions. Emphasis is placed on displaying the results of questionnaires in an easily understandable form and how these may be incorporated into decision-making. The use of questionnaires to promote adherence to the Code's provisions are discussed using several practical applications. The focus is mainly on applications of the Code at the grassroots level by local fisheries management authorities operating within national fisheries jurisdictions.

For further information:

FishCode Programme
Fisheries and Aquaculture Department
Food and Agriculture Organization
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