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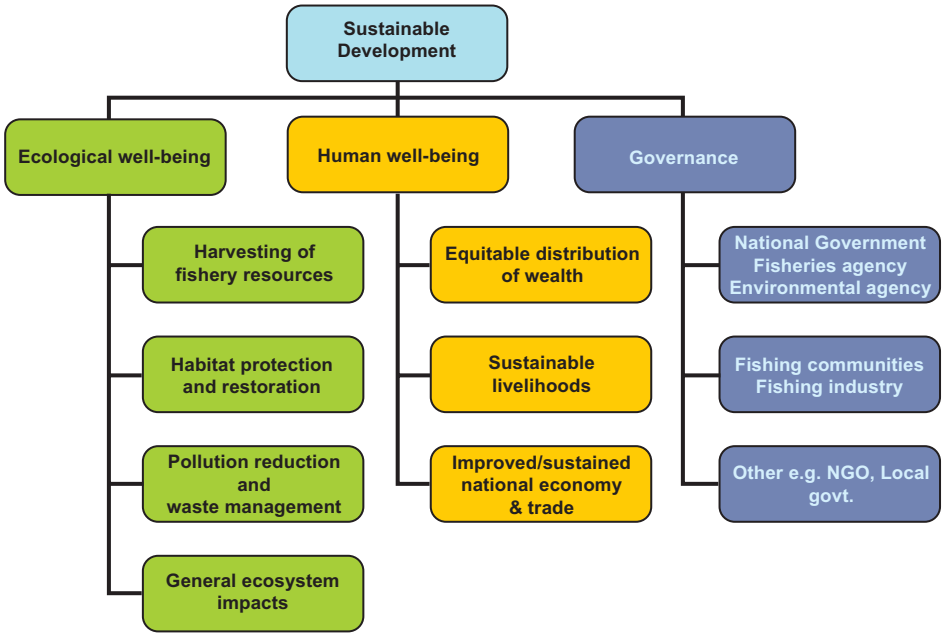
APFIC Regional Consultative workshop

Practical implementation of the ecosystem approach to fisheries and aquaculture

18–22 May 2009, Colombo, Sri Lanka



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FOREWORD

The need to apply an ecosystem approach to fisheries management is now globally accepted and has been endorsed in a range of international decision-making fora. This approach represents a move away from fisheries management systems that focus only on the sustainable harvest of target species towards systems and decision-making processes that balance environmental well-being with human and social well-being within improved governance frameworks.

The FAO Code of Conduct for Responsible Fisheries (CCRF) provides a global framework for responsible fisheries, but member countries, fisheries organizations and fisheries stakeholders require a practical framework to implement the recommendations of the CCRF. The ecosystem approach to management of fisheries (EAF) and aquaculture (EAA) presents such a practical framework whereby the objectives of responsible and sustainable fisheries and aquaculture can be implemented at national and local levels. Although there is an increasing will to move towards more holistic fisheries and aquaculture management and planning frameworks, the practical approach and application of ecosystem based planning and management remains challenged by a lack of familiarity with EAF and EAA and the need for considerable policy reform.

The 2nd Regional Consultative Forum Meeting of the Asia-Pacific Fishery Commission (APFIC) and the 30th Session of APFIC convened in Manado in 2008, recommended that APFIC promote understanding of how to implement ecosystem approaches to aquaculture and fisheries management. They noted too that this would effectively contribute to the implementation of the FAO Code of Conduct for Responsible Fisheries. The session emphasized the need for guidance on how to apply this management approach to the small-scale production sector, the development of offshore fisheries and in the data-poor situations that prevail in the APFIC region.

This report is the proceedings of the APFIC/FAO/Government of Sri Lanka regional consultative workshop convened in response to this recommendation. The workshop brought together 75 participants from member countries across the Asia and Pacific region together with representatives of regional fisheries, aquaculture and environmental intergovernmental and non-governmental organizations, alongside projects and other arrangements. The workshop enabled participants to familiarize themselves with ecosystem approaches to management and explore how these planning and management frameworks can be applied to the complex issues facing fisheries and aquaculture systems that are typical of South Asia, Southeast Asia and East Asia. The workshop also developed recommendations for action directed at APFIC member countries and the regional partners of APFIC for individual or collective action.

The workshop represented a unique opportunity to build awareness and understanding of the potential opportunities that are offered by an ecosystem approach to management and hopefully will lead to the development of ecologically sound action plans for fisheries and aquaculture in the region. I am sure that the outcome of this workshop sees the beginning of wider adoption and implementation of ecosystem based management in the APFIC region, and encourages all to pursue the recommendations contained herein.

He Changchui
Assistant Director-General and
Regional Representative for Asia and the Pacific

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ABBREVIATIONS AND ACRONYMS

APFIC	Asia-Pacific Fishery Commission
ASEAN	Association of Southeast Asian Nations
BMP	best management practice
BOBLME	Bay of Bengal Large Marine Ecosystem
BOBP-IGO	Bay of Bengal Programme Inter-Governmental Organisation
C	consequence value
CBD	Convention on Biodiversity
CCRF	FAO Code of Conduct for Responsible Fisheries
COBSEA	Coordinating Body on the Seas of East Asia
EA	ecosystem approach
EAA	ecosystem approach to aquaculture management
EAF	ecosystem approach to fisheries management
EBM	ecosystem based management
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of the United Nations
FAO RAP	FAO Regional Office for Asia and Pacific
GAP	gap analysis programme
GEF	Global Environment Facility
GDP	gross domestic product
ha	hectare
HACCP	Hazard Analysis and Critical Control Points
ICM	integrated coastal management
ICSF	International Collective in Support of Fishworkers
IECDA	Icelandic International Development Agency
IISD	International Institute for Sustainable Development
IOM	integrated ocean management
IOTC	Indian Ocean Tuna Commission
ISO	International Organization for Standardization
IUU fishing	illegal, unreported and unregulated fishing
L	likelihood value
MCS	Monitoring, Control and Surveillance
MDG	Millennium Development Goals
MFAR	Ministry of Fisheries and Aquatic Resources
MPA	marine protected area
MSC	Marine Stewardship Council
NACA	Network of Aquaculture Centres in Asia-Pacific
NACSA	National Centre for Sustainable Aquaculture
NAFSO	National Fisheries Solidarity Movement
PEMSEA	Partnership in Environment Management for the Seas of East Asia

R	risk value
R&D	research and development
SACEP	South Asia Cooperative Environment Programme
SEAFDEC	Southeast Asian Fisheries Development Center
SIFFS	South Indian Federation of Fishermen Societies
SPF	specific pathogen free
SSF	small-scale fisheries
TWGF	Technical Working Group on Fisheries
UNEP	United Nations Environment Programme
WCPFC	Western and Central Pacific Fisheries Commission

WORKSHOP CONCLUSIONS AND ACTION PLAN

All country representatives agreed that the ecosystem approach to fisheries (EAF) management and the ecosystem approach to aquaculture (EAA) management should be implemented in their countries to manage their fisheries and aquaculture responsibly.

EAF/EAA[1] is a means of achieving sustainable development, contributing to food security and human development by maintaining environmental integrity and enhancing social well-being by reducing intra- and inter-sectoral conflict through participatory approaches and stakeholder consultation. EAF/EAA is a means of bringing people together from a variety of agencies and sectors and is a powerful consultative/dialogue tool.

Application of EAF/EAA implies a balanced approach to addressing ecosystem well-being and thus contributes positively to biodiversity, governance and human well-being, including social development and poverty alleviation. EAF/EAA is very useful in situations where conflict resolution is required.

All countries have EAF/EAA aligned activities and there are many initiatives that are aimed at implementing the FAO Code of Conduct for Responsible Fisheries (CCRF). Many traditional systems have practices that broadly conform to EAF/EAA principles but are not recognized as "ecosystem-based" approaches and there is a lack of appreciation of what is already being done. EAF/EAA is also a useful tool for managing fisheries and aquaculture in inland waters and steps need to be taken to implement this.

EAF/EAA can also be used for addressing the adaptation or resilience of fisheries and aquaculture in the face of climate change impact and effects. It is expected that this could provide funding opportunities for EAF/EAA related work.

Each country has its own context for policy development and resource allocation, therefore implementation of EAF/EAA will differ depending on that context. Many countries note that existing legislation and policy may not explicitly support EAF/EAA and will require amendment or updating.

Mainstreaming EAF/EAA as a national system for management requires strong commitment of government and other relevant stakeholders. The workshop participants agreed that there is a need to improve understanding of EAF/EAA at the policy-making level, noting that short-term planning horizons may constrain a longer-term vision. The involvement of research agencies at national level is important to assist in the initiation of EAF/EAA. Fisheries line agencies have little bargaining power and current resourcing levels may limit broad application of EAF/EAA.

The workshop participants emphasized the need for more effective coordination between sectoral stakeholders, noting that there are few formal mechanisms for consultation, especially when there is a low level of organizational development among fishers and farmers. Stakeholder inclusion was clearly noted as a priority and any planning effort should be built on existing processes and institutional arrangements. The use of local and traditional or indigenous knowledge and local technologies and practices were also emphasized.

EAF/EAA could be started at pilot scale or build on existing systems and might be focused on a specific subsector or issue (e.g. declining fish stocks, cage aquaculture in inland waters). Pilot scale activities should not be undertaken at the expense of national level adoption.

[1] EAF/EAA is a shorthand way of referring to EAF and EAA.

Awareness raising and communication were seen as essential initial steps and resolving the issue of jargon and concepts, particularly in communicating to local level authorities and communities, was seen as a challenge. The need for consistent definitions that can be translated across different languages was noted.

Some examples of ongoing implementation of EAF type activities

Country examples of ongoing initiatives or plans for future action include:

- awareness raising about EAF/EAA;
- development of management areas and habitat enhancement;
- improved dialogue with local level stakeholders;
- improved interagency coordination;
- development of EAF/EAA management plans specifically to support EAF/EAA;
- development of best practice approaches that integrate environmental considerations;
- governance and human aspects in the management of aquaculture; and
- initiation of political level processes to improve support for the approach.

Suggestions for country action over a one to three-year time frame

The workshop participants developed a series of recommended actions which member countries could initiate in order to promote EAF/EAA uptake and implementation:

- Create a country focal point for EAF/EAA.
- Establish a national task force consisting of fisheries, environment and concerned authorities.
- Develop an action plan for the implementation of EAF/EAA (at national level).
- Establish national level pilot schemes, building on existing programmes.
- Review and adapt fishery policy and legislation to support EAF/EAA explicitly (especially with respect to co-management).
- Increase (in real terms) and/or reallocate budget for EAF/EAA.
- Promote public dialogue and communication on EAF/EAA.
- Improve information/data systems to support EAF/EAA information requirements.

Communication and awareness raising are important

There is general agreement that communication and awareness raising related to EAF/EAA are important but require:

- development of EAF/EAA materials in local languages and their dissemination;
- capacity building in the region on the application of EAF/EAA, including monitoring and evaluation;
- community level meetings, training courses and workshops;
- education of political/local government decision-makers;
- sensitization of fisheries staff to EAF/EAA;
- inclusion of EAF/EAA approaches into curricula related to fisheries and environment subjects in schools, high schools and colleges; and
- general public awareness raising.

Some issues which would respond well to EAF/EAA

A number of issues would benefit from EAF/EAA:

- resolving conflicts between large- and small-scale fishers;
- regulating fishing capacity according to sustainable harvesting;
- post-harvest improvements;
- improving enforcement or implementation of existing regulations;
- application of gap analysis programme (GAP) and best management practice (BMP) to national aquaculture;
- interactions between fisheries and aquaculture;
- addressing concerns related to transboundary waters, and shared (by nations) water bodies, watersheds;
- addressing pollution impacts on fisheries and aquaculture sectors; and
- keeping aquaculture development within carrying capacity.

Ongoing or planned action by APFIC partner organizations in support of EAF

Regional organizations have different networks that can be used and they can considerably increase positive impacts when they cooperate.

Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) will carry out a comprehensive scoping study to assess the status of EAF application and suggest priorities to the member countries for implementation.

Bay of Bengal Large Marine Ecosystem (BOBLME) will assist countries in the region to develop strategic action programmes and the facilitation of a mechanism for developing a task force for EAF in the countries of the Bay of Bengal.

Southeast Asian Fisheries Development Center (SEAFDEC) will promote awareness-raising materials and make existing information more available, e.g. contact points in countries (use of national languages). Implement EAF-related programmes (e.g. fishery refugia programme and Andaman Sea linkage with BOBLME. SEAFDEC will also promote and facilitate a regional agreement through ASEAN (fisheries consultative forum).

International Collective in Support of Fishworkers (ICSF) will assists fishers' representation through consultative workshops/meetings (e.g. promotion of use of traditional knowledge).

Coordinating Body on the Seas of East Asia (COBSEA) will promote integration of fisheries management into coastal environmental management in member countries and support the spatial planning of coastal areas (report to COBSEA intergovernmental meeting, November 2009).

Partnership in Environment Management for the Seas of East Asia (PEMSEA) will raise awareness on EAF through educational materials and integrate fisheries into the Manila Bay integrated coastal management (ICM) initiative. There will be greater emphasis on fisheries in the triennial PEMSEA congress.

WorldFish Center[2] will document governance modalities in the region for small-scale fisheries and small-scale aquaculture, including performance indicators. WorldFish will work with countries to share information materials for awareness building on EAF/EAA. Will carry out vulnerability assessments to climate change in the region on fisheries and aquaculture.

[2] Formerly the International Center for Living Aquatic Resources Management (ICLARM).

Network of Aquaculture Centres in Asia-Pacific (NACA) will document what is going on in the region in relation to EAA and facilitate capacity building in conjunction with other partners. NACA will continue to assess vulnerabilities and adaptations of small-scale farmers.

FAO will further develop tools for promoting awareness and application of EAF/EAA including new technical guidelines and a toolbox. FAO will look to support some country level processes to initiate EAF/EAA. FAO may provide technical support to countries upon request from members, but notes the need for high-level prioritization. FAO will continue collaborative activities with regional partners.

Specific workshop recommendations to FAO/APFIC

- APFIC is requested to assist in the development of a uniform reporting mechanism that would satisfy different reporting needs against a range of international conventions and instruments, e.g. CCRF, Convention on Biodiversity (CBD), climate change, UN fish stocks agreement, Millennium Development Goals (MDG);
- provide resource material on simple messages of EAF/EAA, building on existing in-country material;
- provide reference material on successful case studies;
- nominate a focal point in APFIC to provide technical advice;
- facilitate the establishment of EAF/EAA resource person network;
- facilitate interagency dialogue within nations;
- further develop EAF/EAA approaches for inland fisheries;
- address issues related to the application of EAF/EAA on the interface/interdependence of coastal fisheries and small-scale marine aquaculture development in the region;
- promote interagency dialogue with other international organizations with an interest in fisheries and aquaculture, e.g. CBD; and
- create an EAF/EAA section on the APFIC Web site.

OPENING OF THE WORKSHOP

The workshop was opened by lighting the traditional oil lamp and a welcome address by the Director General of the Ministry of Fisheries and Aquatic Resources (*Indra Ranasinghe*, Annex IIa) was followed by introductory remarks from the APFIC Secretary *(Simon Funge-Smith)*. The Secretary of APFIC welcomed all the participants to the workshop (full address is in Annex IIb). He explained that regional inter-sessional workshops on issues considered to be of major regional importance to the Commission have now become part of the Commission's biennial work plans. Mr Funge-Smith further explained that the need for applying an ecosystem approach to fisheries (EAF) management is now globally accepted and has been endorsed in a range of international decision-making fora. He stated that the workshop would work collectively to identify and prioritize related issues and to build this into a list of recommendations for action directed at APFIC member countries and the regional partners of APFIC for individual or collective action.

The inaugural address was made by the Secretary of the Ministry of Fisheries and Aquatic Resources (*G. Piyasena*, Annex IIc) and this was followed by an address by the Deputy Minister of Fisheries (*Hon. Neomal Perera,* Annex IId). A keynote address was delivered by the Minister of Fisheries and Aquatic Resources (*Hon. Felix Perera*, Annex IIe) and the Sri Lankan Ministry of Fisheries and Aquatic Resources workshop coordinator (*Manoj Govinnage*) in his "Vote of Thanks" thanked FAO, APFIC, participants, resource persons and observers for their efforts to make this workshop possible.

INTRODUCTION TO THE WORKSHOP

Workshop objectives and *process*
Simon Funge-Smith (APFIC Secretary)

The presentation outlined the workshop process and the objectives of the workshop, which were to:

a) demystify EAF/EAA, showing how practical planning and implementation tools exist and can be applied to implement EAF/EAA successfully, at different spatial, harvest and production scales;
b) explore how EAF/EAA is being applied in the APFIC region; and
c) develop some initial recommendations for action as to how EAF/EAA could be used more comprehensively as a national and international planning tool and even the basis of regional cooperation in the future. To achieve these objectives, the workshop was divided into three main themes:
    1. Introduction to principles and practices of EAF/EAA.
    2. Practical application of EAF/EAA.
    3. Action planning for APFIC member countries and regional organizations.

It was explained further that the workshop was organized into sessions covering invited technical presentations, country papers, posters describing the experiences of countries with EAF and EAA, and working group discussions.[3, 4] It was explained that the workshop participants would be asked to form themselves into a number of working groups to achieve the workshop objectives. The working groups were being asked to adopt the following steps:

Step 1: Scoping
Step 2: Issue identification
Step 3: Prioritization and risk analysis (presentation)
Step 4: Developing reports on priority issues
Step 5: Preparing integrated EAF and EAA management plans.

INTRODUCTION TO PRINCIPLES AND PRACTICES OF THE ECOSYSTEM APPROACH TO FISHERIES AND AQUACULTURE

Why use the ecosystem approach to fisheries (EAF) and what are its principles?
Gabriella Bianchi (FAO)

The presentation provided a general overview of the key principles of the ecosystem approach, recalling that these are largely contained in agreed international instruments such as the CBD and the CCRF.[5] The EAF reorganizes these principles and makes their application more compelling.

Although the principles that characterize the EAF are now broadly recognized and accepted, and some countries have made good progress with their application, best practices appropriate to different regions are still under development. The workshop should be seen as an opportunity to share experiences on improving available methodologies to make them more relevant to developing countries.

[3] The workshop agenda is in Annex I.
[4] The participant's list can be found in Annex III.
[5] FAO (1995). *Code of Conduct for Responsible Fisheries*. Rome, FAO. 1995, 41 p.

EAF, as promoted by FAO, is not considered a major departure from conventional fisheries management but rather an extension of this with a greater emphasis on the sustainability concepts as articulated in the CCRF. Table 1 shows a comparison of key features of a management system under the conventional approach and under an ecosystem approach, highlighting where the EAF may respond to broader issues that affect fisheries management.

Given the broader scope of EAF as compared to conventional fisheries management, and the often limited resources that fisheries administrations and research institutes experience, applying EAF requires a process of prioritization to identify which areas need most attention or pose greater environmental risk, i.e. it is not merely adding new elements to conventional fisheries management.

A distinction was made between cross-sectoral and sectoral approaches. Cross-sectoral approaches deal with goals for sustainable development in a given region/ecosystem, including all sectors (e.g. fisheries, mining, shipping, tourism etc.). Mechanisms are established for allocation of rights to different user groups and to reconcile user conflicts. Examples of cross-sectoral approaches include ecosystem based management (EBM), integrated ocean management (IOM), and integrated coastal management (ICM). Sectoral approaches, such as EAF, focus on managing a given sector in a way that is consistent with the framework provided by the global strategy.

Table 1 Conventional and ecosystem approaches to fisheries management contrasted

Conventional approaches	Ecosystem approaches
Few fisheries management objectives.	**Expanded scope** of fisheries management to explicitly address ecosystem and socio-economic considerations.
Sectoral, i.e. focuses mainly on fisheries sector issues.	Deals more explicitly with the interactions of the fishery sector with **other sectors**, e.g. coastal development, tourism, aquaculture, navigation, petroleum industry.
Deals mainly with **target species**.	Responds to concerns of the **broader impacts of fisheries** on the marine ecosystem, including impacts on the habitat, on vulnerable species, on biodiversity etc.
Addresses fisheries management issues at the **stock/fishery scale**.	Addresses the key issues at the **appropriate spatial and temporal scales**. These are often nested (local, national, sub-regional, regional, global).
Predictive, with decision-making mainly **based on results from mathematical or statistical models** that assess the outcomes of different management strategies.	Given the uncertainty associated with many of the issues to be dealt with, because of limited data availability and poor knowledge of relevant processes, **adaptive** strategies are recognized as being more useful.
Scientific knowledge is considered the **only** valid knowledge as a basis for decision-making.	Recognizing that it is not possible to obtain scientific knowledge on all the issues to be dealt with, alternative knowledge (e.g. **traditional knowledge**) can be utilized as a basis for decision-making.
Operates through **regulations and penalties** for non-compliance.	**Encourages compliance with regulations through incentives.**
Top-down (command and control) approaches typifies conventional fisheries management	**Participatory** approaches, e.g. various forms of co-management are a key feature of EAF.
Addresses **mainly corporate** (fisheries sector) interests.	Addresses the interests and aspirations of a **broader stakeholder community**.

Why use the ecosystem approach to aquaculture (EAA) and what are its principles?
Doris Soto (FAO)

The presentation drew attention to the fact that aquaculture growth worldwide is leading to the expansion of cultivated areas, higher density of aquaculture installations and of farmed individuals, and the use of feed resources produced outside of the immediate area, and therefore many negative effects are resulting when the sector grows unregulated or under insufficient regulation and poor management. An ecosystem approach to aquaculture is a strategy for the integration of the activity within the wider ecosystem in such a way that it promotes sustainable development, equity, and resilience of interlinked social and ecological systems. This definition essentially recaps the ecosystem-based management approach proposed by the CBD and also follows the recommendations of the CCRF.

An EAA should be guided by three key principles:

i) Aquaculture should be developed in the context of ecosystem functions and services with no degradation of these beyond their resilience capacity.
ii) Aquaculture should improve human-well being and equity for all relevant stakeholders.
iii) Aquaculture should be developed in the context of (and integrated with) other relevant sectors. Three scales/levels of EAA application have been identified and are discussed here: the farm; the water body and its watershed/aquaculture zone; and the global, market-trade scale.

The adoption and implementation of EAA is necessary to guarantee aquaculture's contribution to sustainable development and the presentation highlighted the main aspects of this strategy, providing some examples and discussing the main challenges for its implementation.

More information on the EAA is available in the publication *Building an ecosystem approach to aquaculture (FAO, in press)*.

Human and social dimensions of the ecosystem approaches (EAF and EAA)
Cassandra DeYoung (FAO)

An overview of the human dimensions of the ecosystem approach (EA) was provided in this presentation. As the implementation of EA to management is a human pursuit and takes place in the context of societal goals and aspirations, the human forces at play need to be understood and considered.[6] These are manifest in a variety of ways and include policies, legal frameworks, social structures, cultural values, economic principles, institutional processes and any other relevant form or expression of human behaviour. Briefly, the human dimensions play the following four roles in EA:

1. Social, economic and institutional objectives and factors may be driving forces behind the need for EA management.
2. The costs and benefits to individuals and to society of applying the EA have social, economic and institutional impacts and implications.
3. The applications of social, economic and institutional instruments are all crucial for successful implementation of the EA.
4. Social, economic and institutional factors present in fishery systems can play either supporting or constraining roles in EA implementation.

[6] More information on the human dimensions is available in the FAO Fisheries Technical Paper. No. 489 – *Human Dimensions of the Ecosystem Approach to Fisheries: An Overview of Context, Concepts, Tools and Methods* and the soon to be published FAO Technical Guidelines for Responsible Fisheries – *4. Fisheries Management Supplement 2.2. The human dimensions of the ecosystem approach to fisheries.*

The presentation discussed these four “roles” in detail with the aim of improving EA implementation. It was noted that if one does not make the attempt to understand why people act as they do, EA policies, legal frameworks, management plans, even with the best of intentions, will produce unintended consequences or will not be followed at all, thus increasing the EA’s chances of failure.

Plenary discussion on the “Introduction to principles and practices of the ecosystem approach to fisheries and aquaculture”

Questions concerning what would be covered in the workshop were raised during the presentations, e.g. would it include interactions between aquaculture and fisheries, and between small-scale fisheries and inland fisheries? The response from the speakers was: first, EAF/EAA can be applied to all subsectors of capture fisheries and aquaculture; and second, because it was a participatory workshop, any topic will be considered if the participants feel that it is important. Some other technical questions were also answered and, in general, most of these were dealt with in subsequent presentations and working groups.

Country presentations on experiences of EAF/EAA

Each of the participating APFIC member countries gave a short presentation on case studies or examples relating to experiences with the ecosystem approach to fisheries/aquaculture in their respective countries.

Bangladesh The rich biodiversity of the country was noted. It has vast water resources, many rivers (three major rivers) and a high production of fisheries and aquaculture on a global scale. Fish constitute 60 percent of the protein requirements of the people of Bangladesh. Fisheries are governed under the National Fisheries Policy (1998) that covers the EAF/EAA. The more recent National Fisheries Strategy (2006) contains sub-strategies for each subsector e.g. inland fisheries, shrimp, aquaculture, as well as monitoring and evaluation, quality control and human resources development sub-strategies. The implementation of the ecosystem approach covers both aquaculture and fisheries and different production types, including inland fish sanctuaries, coastal sanctuaries and alternative livelihoods, e.g. Hilsa juvenile fishers are now tilapia cage culture farmers. Aquaculture issues include environmental carrying capacity, conservation of genetic diversity, food safety, biosecurity, and conservation of endangered species. For capture fisheries, they include dry season water flows and national sanctuaries.

A case study involving a Hilsa Management Plan was described. Hilsa is the main single species fishery in Bangladesh and management measures, including the protection of juvenile fish, have resulted in increased production. Bangladesh suggested regional cooperation through training and exchange visits, exchange of good practice and bilateral discussions.

Cambodia The uncertainty regarding what EAF and EAA involve was noted, and the country’s planning and policy development framework was outlined. The framework is based on a National Strategy Development Plan, a government declaration on the national fisheries sector, and a new fishery law. The major policy change is from a government controlling/inspection role to the role of service provider.

The fisheries policy strives to improve food and nutrition security, poverty reduction and environment improvement. The main approach is through co-management and community fisheries and includes a livelihood improvement programme. To coordinate the work of development partners, a Technical Working Group on Fisheries (TWGF) has been formed. This meets monthly to coordinate fisheries development. Recent achievements have included the formation of community fisheries throughout the country, a livelihoods programme for poverty reduction, and harmonization of stakeholders through the TWGF that provides a forum for discussing different policies, different objectives and addressing conflicts.

Based on a new initiative “Fishing for the future”, Cambodia has introduced a new strategic planning framework that includes “Camcode” – a code of conduct for responsible fisheries for Cambodia. A range of issues and actions were presented for both capture fisheries and aquaculture. One of the main constraints was the poor understanding of EAF/EAA requiring human capacity building and strengthening institutions. There is a lack of regulation and technical guidelines to support new fisheries law. The need to spread effort and actions to grassroots level was highlighted.

India The huge size of the country and its abundant resources totalling 2 200 aquatic species were highlighted. A range of issues facing India were described for both capture fisheries and aquaculture. These included stagnating marine catches, slow development of mariculture, inadequate post-harvest processing, and different regulations among states, e.g. mesh size and fishing bans. In planning, a major shift from open access to user rights fisheries is needed. This will involve registration and licensing of vessels, reducing overcapacity, minimizing the catch of juvenile fish, controlling the collection of wild seed and better awareness and human resource and information systems.

In coastal aquaculture, a large area is available but previous bad management practices have resulted in widespread disease problems. Culture of fish is not being taken up, which probably reflects a reaction to previous bad experiences. Better management is required including meeting the demand for specific pathogen free (SPF) seeds, abating pollution, better feeds, etc. Many national policy and planning documents are available, but the planning needs to be translated into action. Integrated coastal management needs to be strengthened along the lines of the cluster farmer approach of the National Centre for Sustainable Aquaculture (NACSA). Fresh water aquaculture in India exceeds 3.2 million tonnes and the plan is to double production in the next five years through improved management of reservoirs and a community approach involving a stocking programme.

Indonesia The high priority given to the impact on and involvement in fisheries and aquaculture at the community level was noted. The presentation highlighted the division of the extensive Indonesian archipelago into fisheries management areas that are rational geographic divisions that also follow jurisdictional and administrative boundaries. Live ornamental fish are among the most important fishery products and a high priority is given to their harvest and supply. Some of the outstanding elements in fisheries management are the development of a plan of action to manage sharks in Indonesia and address problems with deep sea trawling. The main challenges for Indonesia include multispecies and multigear fisheries, problems with stock assessment, inadequate resources management, failure to abandon the open access system despite the problem of small-scale fisheries, and corrupt practices. Among the country’s most important aims are strengthening the legal and institutional framework for fisheries management, increasing consultative, cooperative and coordinative efforts among decision-makers, increasing awareness of stakeholders and decision-makers, developing a fisheries management plan with the strong participation of stakeholders, applying a precautionary approach in management and developing of certification systems for fisheries and aquaculture (as promoted by the Marine Stewardship Council (MSC), International Organization for Standardization (ISO), the Hazard Analysis and Critical Control Points (HACCP) and others).

Other issues include inadequate human resources capacity, and the need to improve consultation and stakeholder participation (it is starting to happen). Limited experience in the ecosystem approach to fisheries and aquaculture and limited understanding on the impact of globalization (impact of market forces) are also recognized as issues.

In Indonesia, aquaculture is the fastest growing food sector, although it is facing typical problems and issues such as those concerning the production and availability of good quality seeds and feeds, water pollution from and to the sector and important concerns with food safety.

In the discussion following the presentation the presenter was asked to say more about the experience with participation processes and how to comply with international obligations of the government. The

presenter stated that Indonesia is trying hard in terms of stakeholder participation and with some success through community development and decentralization processes. Regarding international obligations, Indonesia is trying to increase understanding of the country from the outside; a coordinated core group for the management of certain areas has been created.

Japan Fishermen are ordinary people and they live on marine ecosystems stated the Japanese presenter. Fishers have to be aware of their connection with the ecosystem. However, fishers are not the sole guardians of the ecosystem. Marine ecosystems are not only the responsibility of the fishers, but are the shared responsibility of all stakeholders. The government has attempted to convince fishers that their resources are in their hands to manage and they have to use them wisely. Japan has made many efforts to conserve marine ecosystems such as by supporting fishers' initiatives to conserve marine resources. There is a special programme for conservation of fishing grounds and the construction of artificial mud flats for seeding and harvesting of benthic resources. Another initiative is the rehabilitation of seagrass beds that have been lost or damaged causing a decline in fishery resources. Also planting or replanting seaweed forests that have been lost resulting in a lowering of sea urchin quality because of undernourishment has been carried out. One of the problems was a potential imbalance between sea urchins and seaweeds and the extraction of excess sea urchins was necessary. After this, the seaweed forest was able to recover to some extent. This demonstrates that developing the fishers' understanding of marine ecology is important for adopting an ecosystem approach.

Maldives An overview of fisheries in the Maldives was first presented. This was followed by a specific case study on EAF implementation. Following tradition, the fishers use mainly pole and line and handline targeting skipjack tuna, yellowfin tuna and reef fisheries. It is felt that these fishers have few negative impacts on the aquatic environment. Aquaculture in the Maldives is still in the infant stage, but currently pearls and sea cucumbers are cultured, with investigations of the potential to farm grouper under way.

The issues facing fisheries management include the need for: 1) human resource development for fisheries management and development; 2) long-term planning issues (note: Maldives are developing a fisheries management plan); 3) a data collection system and information management; 4) fisheries monitoring and evaluation; and 5) improved law enforcement.

The issues facing aquaculture management include the need to develop a legal framework and human resources for management, monitoring, evaluating and R&D within the aquaculture subsector.

Fisheries management in the Maldives is regulated by two acts: the Environmental Protection and Preservation Act of 1993 and the Fisheries Act of 1987; the revision of the latter based on the CCRF is under discussion.

The presenter provided an EAF case study relating to shark management in the Maldives. Until the 1970s, sharks were mainly exploited for liver oil but current uses of sharks include for fins, meat and squalene rich oil. There are three shark fisheries: 1) the deepwater benthic shark fishery; 2) the reef shark fishery; and 3) the oceanic shark fishery. As there is no local consumption of shark products, most of the catches are exported. A valuation study estimated the value from non-extractive shark recreational scuba diving to be US$2.3 million from divers; whereas the export value of shark products was US$0.7 million. In addition, it is also believed that sharks follow tuna schools and prevent them from scattering; making tuna catching more efficient for those fishers targeting tuna. Therefore, there are multiple potential gains from shifting to non-extractive shark tourism.

The current management measures include a ban on reef shark fishing in atoll basins and out to 12 miles surrounding atoll rims. In addition, there is a ban on longlining for sharks in two seamounts in the south that are important tuna fishing grounds. There is a desire for a blanket ban on shark

fishing in the Maldives within one year from March 2009 because of the difficulty in differentiating between shark species, which, therefore, renders single-species bans difficult to enforce. There are strong links with the tourism sector, which is contributing to livelihoods diversification by encouraging shark fishers to engage in tourism-related activities.

In the discussion following the presentation, when asked about integrated coastal management and reef cage culture possibilities, it was indicated that work is ongoing but details were not available.

Malaysia Some of the issues facing capture fisheries and aquaculture in Malaysia were presented. Among these were, for capture fisheries, dwindling fishery resources and low levels of awareness on sustainable resource exploitation and, for aquaculture, low levels of awareness of and technical knowledge pertaining to good and environment-friendly aquaculture practices. To address some of these issues a project titled "Integrated coastal resources management (ICRM) – Pulau Langkawi" has been developed. The objectives of this project are threefold: 1) to provide technical assistance for the sustainable development of coastal fishery communities in Pulau Langkawi; 2) to introduce the community based resource management (CBRM) approach to the management of fisheries in Langkawi; and 3) to implement a pilot project using the CBRM/ICRM approach in Kuala Teriang, Langkawi. The stakeholders were identified and lessons learnt were documented. The statements from Kuala Teriang communities at the end of the project were as follows: 1) they observed an obvious reduction in the extent of encroachment by trawlers thanks to equal commitment by the community and DOF; 2) their household incomes have been encouraging; 3) they observed the re-emergence of long disappeared species; 4) they are more convinced they are a part of the management process; and 5) as a community they are more united on how to manage the fishery resources.

Myanmar Data on their fisheries and some issues related to EAF were presented. It was noted that Myanmar is one of the largest mainland countries in Southeast Asia with a long coast line and substantial continental shelf and EEZ. Marine fishing is demarcated to four grounds: 1) inshore – in which there is a ban on commercial vessels from 0 to 5 or 10 miles to minimize conflicts with small-scale fisheries (with motors less than 12 horse power (Hp) and vessels length <30 feet); 2) offshore – from the outer limit of inshore fishing zone to the EEZ (with vessels >12 Hp and >30 feet); 3) inland fisheries – leasable fisheries; 4) inland fisheries – open fisheries. It was noted that the offshore fisheries are large-scale commercial, whereas the inshore and inland fisheries are small-scale fisheries. The majority of vessels are either non-powered or small-powered. Some larger national vessels and a small number of third party vessels exist.

Fisheries policy in Myanmar centres on: 1) the promotion of all-round development; 2) the increase in fish production for domestic consumption; and 3) the expansion of aquaculture for the improvement of human well-being. Overfishing and declining productivity in coastal regions led to the updating of the Myanmar Fisheries Laws.

Issues in Myanmar include the lack of: 1) monitoring and surveillance programmes and law enforcement; 2) education and awareness programmes at community level; and 3) well trained staff to implement the EAF. It was noted that:

- a strong monitoring, control and surveillance system is important for ensuring the effectiveness of fisheries management measures;
- the establishment of efficient monitoring, control and surveillance (MCS) is essential for controlling over-capacity and illegal, unreported and unregulated (IUU) fishing;
- collaboration and cooperation with neighbours is necessary;
- there is a need for implementation of improved post-harvest technologies to reduce fishing pressure; and
- education and awareness building at the grassroots level is crucial.

On the issue of disseminating information to and building the awareness of stakeholders, workshops and education strategies are being stressed in Myanmar.

Nepal Some general information about fisheries and aquaculture in Nepal was presented followed by some of the issues related to EA implementation. In terms of aquaculture, Nepal's strategy focuses on an increase in fish production and livelihoods improvement through extensive and semi-intensive aquaculture. Although in its third year of implementation, political instability has made implementation difficult. In fisheries, Nepal is in the process of developing legislation to protect and enhance its aquatic resources, noting that fisheries contribute 2.5 percent of the country's agricultural gross domestic product (1 percent of the country's GDP). Application of EAF is still uncommon because of unfamiliarity with the concept.

Issues identified in Nepal include:

- the status of fisheries resources are not known; however, fishing is very popular and has great potential;
- aquaculture practices are not intensified because a lack of regular input supply (e.g. feed) remains a bottleneck for the subsector and proper technology for specific ecological zones is still to be developed;
- lack of legal instruments causing loss of biodiversity (a new act is in the pipeline); and
- irrational urbanization, overgrazing, encroachment, construction of reservoirs, big dams, barrages and roads affect the ecology of fish species.

Positive aspects include the fact that the ecological and biophysical diversity existing in Nepal offers comparative advantages and opportunities to grow a large number of high valued species, but effective environmental protection is required. Efforts need to target beneficiaries such as disadvantaged and marginalized communities, with training and awareness raising, legal instruments, integrated pest management, in line with CCRF as priority areas. To attract the low-income farmers into the sector, small-scale fisheries should be supported by proper technology to minimize their capital costs and regular input supplies should be ensured. Concerning the protection of biodiversity, Nepal has a breeding programme but there remains much to do as natural populations are being reduced.

Pakistan The marine and coastal resources of Pakistan and the relevant fisheries legislation and ordinances that relate to fishery management were reviewed. There are local measures including closed seasons and restricted gears as well as national level measures relating to effort limitation and zoning. A case study of the interaction of shark and Indian mackerel fisheries was presented. The decline in shark fisheries because of fishing pressure has seen a rapid rise in the Indian mackerel fisheries, which are targeted by Pakistan's coastal fishers. This is an example of the ecosystem level impact that occurs with the reduction of top end predators. The catch of the Indian mackerel has not continued to increase. There have been efforts made to restrict the impact of larger-scale fishing operations on the coastal fisheries.

Philippines The focus of the presentation was a case study of the inland water body, Taal Lake. The Philippines has developed an integrated management plan that balances environmental well-being with the productive uses of the lake for fisheries and cage aquaculture. Institutional linkages have been developed between the environment agency, the fisheries agency and the local government units. The lessons learned from this work have shown the importance of effective communication and networking between the relevant stakeholders as well as the need to balance the differing objectives of livelihoods and food production and environmental sustainability. There has been an overall improvement in understanding for all stakeholders on the importance of environmental management and ensuring that production systems remain within limits that can be sustained by the lake environment.

One participant noted that the situation in the Taal Lake example of the Philippines is very similar to the experience of Indonesia regarding several volcanic lakes in Java, Indonesia and a similar consultation processes was initiated in these lakes to resolve the issues of overcrowding and maintenance of environmental quality.

Sri Lanka Production from fisheries in 2008 was 274 000 tonnes of which 44 000 tonnes was from aquaculture. There is increasing fishing pressure on inland fisheries and fisheries resources have been depleted. Unsuitable fishing gear and methods have been used. However, deep sea offshore fisheries and the fisheries in the north and east have been underexploited. In aquaculture, there are limited hatcheries and the expectation of free seed for stocking. Land and freshwater resources are also limited.

A case study of the ecosystem approach was presented with the subject being the Bar Reef project for sustainable fisheries. This is a bottom-up collaborative approach to fishing. An environmental profile using secondary information has been prepared as part of the project and a plan has been developed based on scientific inputs on stock assessment and biodiversity. The consultation process with stakeholders has been expanded. To succeed it needs positive cooperation and consensus among the various government departments involved with fisheries and wildlife. Seaweed and sea bass culture have started in the area as well as shrimp culture, but the latter has been developed by investors from other parts of the country.

Thailand Thailand is one of the top fish producing countries with about 4.1 million tonnes produced in 2006 generating US$4 000 million. Thailand has a long coastline of nearly 3 000 km. Production is dominated by fisheries but is increasingly supplemented by aquaculture. The main issues for Thai fisheries are to use fisheries resources sustainably and without negative impact to the environment, under the joint administration and management of Thai people, the community, local organizations, and the government. Some major areas where improvements are ongoing are:

- efficiency enhancement of marine fisheries management system and co-management;
- structural strengthening and efficiency improvement of fisheries bodies;
- development and promotion of responsible and sustainable fisheries; and
- ecosystem and fishing ground rehabilitation to safeguard biodiversity and marine environmental quality.

A case study of Kung Krabaen Bay Royal Development Study Centre Kung Krabaen Bay and watershed area was presented. This has a total area of 5 760 ha. Before 1981, this area was a remote area and disconnected to the mainland by mangrove and swamp areas. People were very poor and earned their living by rice growing and small-scale fishing. DOF introduced coastal oyster culture to the villagers using the hanging culture method in the bay. The Kung Krabaen Bay Royal Development Study Centre was established under a royal initiative to develop the coastal area of Chanthaburi Province. The major obstacles to development are mangrove destruction, decline of coastal fish stocks, and saline water intrusion into agricultural lands, which not only cause environmental deterioration but also adversely affect the way of life of the local fishers and farmers. The overall management of the projects of the Centre is under the responsibility of the Department of Fisheries.

Planning activities include:

- reallocation of the 116.5 ha of deteriorated mangrove area and paddy field for coastal aquaculture activities;
- shrimp culture extension with environmental conservation;
- mangrove forest conservation and reforestation;
- seagrass conservation and management;
- sustainable agriculture extension; and
- standard of living development and environment impact management.

Viet Nam The rapid growth the fish production sector has achieved during the last two decades has been a direct result of the sector diversifying its farming practices and adapting to the production of exportable species at increased levels of intensification. The Mekong River delta provides over 75 percent of the total marine landings and therefore most of the fishing industry is concentrated in the southern provinces, from Khanh Hoa to Ca Mau. Constraints for the fisheries sector include increased pressure on the fisheries from traditional fishing grounds (<50 m deep) and benefits for fishers are decreasing.

The aquaculture systems are diversified according to national geographical and climatic conditions: the northern region is dominated by freshwater fish ponds, rice-cum-fish and marine cage culture; the central regions concentrate on the intensive culture of giant tiger prawn and the marine cage culture of fin fish or lobster; and the southern part of the country has the most diversified and fast growing farming activities that include pond, fence and cage culture of catfish as well as several indigenous species. These also include various intensification levels of giant tiger prawn culture and integrated culture such as rice-cum-fish, rice-cum-prawn and mangrove-cum-aquaculture. Production of catfish and tiger prawn have been the most rapidly growing, mainly for export markets. Aquaculture infrastructure is limited and insufficient for the potential growth. There needs to be improvement of seed quality, improved feed and less use of medicines. There needs to be capacity building for skills and national management policies need to be adapted to today's aquaculture development.

To find out the most suitable management model in Viet Nam, eighteen community-based models were implemented at 18 different sites. The main lesson learnt from the case studies was that the success was greater at sites where there was active involvement of the government in advising, coordinating and supporting the implementation of the model. Such consideration should inform all steps of fisheries co-management. The legal framework and the supportive policy enabling environment for community-based fisheries management need to be further strengthened. Without a strong legal and policy environment, community-based management might be difficult to develop properly.

Progress made by countries in the region in implementing EAF and EAA
Derek Staples (APFIC/FAO consultant)

A compilation based on the country papers provided by Bangladesh, India, Indonesia, Japan, Malaysia, Maldives, Myanmar, Pakistan, the Philippines, Thailand and Viet Nam, country case study posters and presentations, an overview of progress made by countries in the region in implementing EAF and EAA was presented. Three main criteria for assessing progress were used:

a) dimensions and components included in fisheries and aquaculture under the ecosystem approach (ecological, social, economic and governance);
b) making EAF/EAA operational – from principles to action; and
c) scope of implementation – local project or mainstream activity.

The papers on EAF and EAA described issues covering ecological well-being, human well-being and governance. In marine capture fisheries, there were more issues relating to the fishery resources than to other components. For inland fisheries there was more emphasis on ecological well-being and human well-being, and aquaculture had a more balanced approach covering both ecological well-being and human well-being.

All APFIC countries have good national policy documents that support EAF/EAA and in many these are incorporated into national plans that are linked to budgets. However, those relating to capture fisheries tend to be better developed than those relating to aquaculture. These provide a set of basic principles that if implemented should result in sustainable development. However, the translation of high-level principles into actions is patchy. There are some excellent examples of species/area specific

plans and implementation of EAF/EAA in the region but many of these are donor driven and not mainstream activities. Many good case studies in the region also exist. The main lessons learnt include the importance to success of: (i) awareness and education; (ii) government and nongovernment partnership; (iii) stakeholder engagement; (iv) empowering stakeholders to co-manage; (iv) planning that reaches common goals; (v) demonstrated results; and (vi) monitoring and evaluation.

The workshop highlighted the need to learn from each other (look at the country examples and learn). Furthermore, the problem of introduced species was described through a case study on shrimp culture. It was also noted that it is important to have a dialogue (e.g. in coastal communities) and to have a broad enough framework to include all stakeholders.

Finally, the workshop inquired into the definition of EAF and EAA, especially in cases that include both aquaculture and fisheries, and it was suggested that perhaps the term "ecosystem approach" (EA) should be used when the issues being discussed encompass all issues and stakeholders.

Interactions between fisheries and aquaculture – examples of interactions in the region
Miao Weimin (APFIC/FAO RAP)

The presenter pointed out that according to the definition of FAO[7] an ecosystem approach to fisheries (or aquaculture) strives to balance diverse societal objectives by taking into account both knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries and aquaculture within ecologically-meaningful boundaries. Therefore, effective implementation of the ecosystem approach to fisheries and aquaculture should be able to ensure that different sectoral/subsectoral activities that share more or less the same resources and ecosystem boundary are successful in the long term. Aquaculture and fisheries are very closely related subsectors and both are dependent on the same aquatic resources and aquatic ecosystem and often strongly interact with each other. Therefore, effective development and implementation of an ecosystem approach to aquaculture and fisheries primarily depends on understanding and clearly identifying relevant interactions of various aquaculture and fisheries activities.

Asia and the Pacific region is characterized by very diverse aquaculture and fisheries practices. Different aquaculture and fisheries activities often have different impacts on each other. This presentation listed the most relevant interactions in the region by looking into the mutual impacts (both positive and negative). Some common examples include the use of pelagic fish and trash fish to feed farmed carnivorous fish could have damaging impacts on wild populations. The escaped of farmed fish particularly when they are exotic can have impacts on wild populations. However restocking natural populations with farmed seeds can have positive impacts.

The presentation provided the workshop participants with some basic facts for consideration in developing and implementing an ecosystem approach to fisheries and aquaculture in the region. Some conclusions were drawn from the analysis of the different interactions and these may provide some thoughts for the workshop participants in terms of policy and the strategic development of an ecosystem approach for planning, managing and implementing aquaculture and fisheries development activities in the region.

The workshop participants noted that aquaculture can contribute to increased livelihoods by converting fishers into farmers and wanted to know if this is a viable option and what are the numbers (e.g. how many fishers are turned into farmers?). It was noted that regionally, this is hard to quantify because, typically, aquaculture is included in the portfolio as a supplementary occupation of fisher families rather

[7] FAO. 2003. *Fisheries management. The ecosystem approach to fisheries.* FAO Technical Guidelines for Responsible Fisheries, 8. Rome.

than a complete replacement. Nevertheless, some examples exist (e.g. China Lake, where formerly 50 000 traditional fishers – from the late 1980s shifted to aquaculture – after 10 years – 30 000 ha – 1 000 fishers into farmers). The economic impact of aquaculture was highlighted, e.g. the high production of fish from aquaculture may decrease the price of wild caught fish.

Another important issue is food security, especially in Asia and the Pacific region where large coastal communities are highly dependent on fish for food/nutrition. The choice between livelihoods and environmental issues becomes harder when you have this high-level of dependency.

Poster session

Fourteen posters from countries and organizations were presented under the theme *Ecosystem approach to fisheries and aquaculture in the respective country and organization*. The presentations identified and prioritized the top five issues for the sustainable development of capture fisheries and for the sustainable development of aquaculture. In addition, a case study on the ecosystem approach in either fisheries or aquaculture was described and the main lessons learnt in the case study were highlighted.

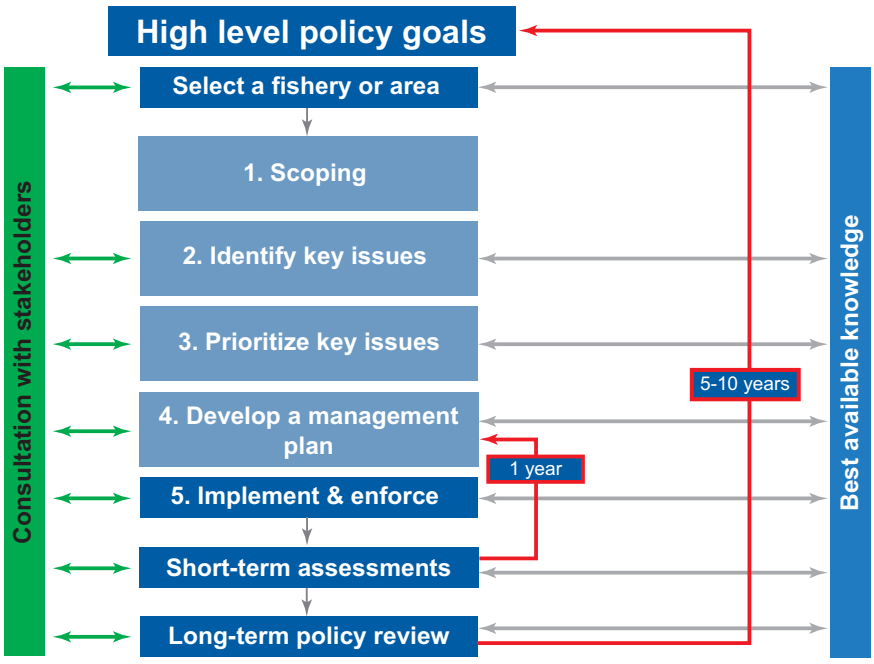
PRACTICAL APPLICATION OF EAF/EAA

An introduction to the tools used in EAF/EAA was presented to participants followed by hands on activities on planning under EAF and EAA. There were four groups based around two major regions and the subsectors of fisheries and aquaculture.

The key steps of the fisheries management and planning process under an EAF

Gabriella Bianchi (FAO)

The presentation outlined the key steps of the fisheries management process to show at what stage the risk-assessment methodology for issue identification and prioritization fitted (Figure 1).



Source: FAO Guidelines

Figure 1 EAF Planning and implementation process

The planning and implementation process under an EAA

Doris Soto (FAO)

The planning and implementation of the EAA strategy follows a very similar pathway to EAF, with the five steps (scoping, identifying and prioritizing issues, developing a management plan, implementing and enforcing). In some cases, a broader and more relevant exercise may be required, i.e. when stating high-level policy goals. Often there are contrasting goals and society must make a choice. Another necessary prior exercise is to define whether the planning and implementation of the strategy will cover the whole aquaculture sector of a country or region, or (more typically) will address an aquaculture system or aquaculture area in a country or sub-region.

Discussion session

The discussion following the presentations revolved around three major themes: a) stakeholder involvement and dialogue; b) governance; and c) knowledge and information.

Stakeholder involvement and dialogue*.* The EAF/EAA planning frameworks may appear to be "top down", but they are heavily reliant on the stakeholder dialogue. The "top down" aspect is the provision of a planning framework and a process initiated by government agencies, however, the development of the plan and its operational aspects is dependent on the stakeholder input. This will determine the issues, the degree of priority given to them and the ways in which they will be addressed. The workshop participants questioned the compatibility of the ecosystem approach and co-management, and the response was that they are largely complementary. The rights and degree of empowerment of stakeholders has an important impact on their ability to engage in the decision-making and planning processes. The effective inclusion of stakeholders must take into account the ability to participate and ensure that stakeholders are properly identified and measures are put in place to ensure their participation. This is a challenge in the Asian region where farmers and fishers may not be part of large organizations or federations and their numbers mean that the process of stakeholder dialogue requires significant financial resources and time. The matter of representation of stakeholders may also be a flawed process where political leaders are charged with the levering of benefits from government and to act as an interface between the electorate and the government. This means that there may be filters in the process of dialogue and representation whereby measures or processes that require politically unfavourable outcomes may be distorted or filtered through representatives. This requires a process to ensure that representation is valid and that the small-scale fishers and farmers are adequately represented in a manner that corresponds to their priorities and interests.

Governance*.* The adoption of an EAF/EAA management approach assumes that there is political will to address the three areas of human well-being, environmental well-being and ability to achieve. The rapid turnover of high-level policy staff in government and short government political terms does limit the long-term strategic implementation of an ecosystem approach to management. This emphasizes the need for longer term commitment which spans the short-term appointment and three-year planning and budget horizons. There is often a disconnection between national planning and policy goals and the practical goals and implementation through local government decentralized units. At local levels there is often an emphasis on production increase and income generation and the balancing of this against environmental and governance issues may not be apparent. This calls for a consistent approach across the levels between national and local levels and reinforces the importance of having an inclusive framework which allows for this harmonization of policy and operational objectives. Human resources are a critical factor and include lack of capacity as well as difficulties of retaining good staff in the government sector. The need for fisheries departments to initiate dialogue challenges their current way of approaching dialogue (e.g. participatory stakeholder dialogue can be an unfamiliar way of working). The process of making laws and fisheries management

plans is also reliant on the underlying legislation that provides the basis for rights and legitimizes the decision-making process. The initiation of planning by communities can lead to effective local management plans, however it is important that these are legitimized or placed within broader planning frameworks, otherwise there are risks of these local planning actions being undermined by outside forces that lie beyond the power of communities to address within their local systems of management.

Knowledge and information. Knowledge and information should not be narrowly understood as simply written technical material but includes the wealth of local and operational knowledge of farmers and fishers that may not be in written form but constitutes the knowledge basis for a fisher and the ways in which fishers and fish farmers operate. This does not mean that the information or knowledge is always correct. It must be seen in context, and when done so often proves to be a more reliable indicator of a situation than prevailing statistics or trends that may contain errors or be over-aggregated. The innovations of farmers and fishers often move ahead of published technical material and can prove to be an important resource during stakeholder discussions.

Introduction to working group activities and selection of case studies for practical work
Simon Funge-Smith (APFIC)

The steps (Figure 1) were explained in detail with the workshop participants breaking up into working groups based on their country's geographical location and fishery issues. The three working groups were composed as follows (Table 2 for details):

a) Bay of Bengal marine capture fisheries
   - Bangladesh, India, Indonesia, Maldives, Myanmar, Pakistan, Sri Lanka, Thailand
   - BOBP-IGO, BOBLME, National Fisheries Solidarity Movement (NAFSO), South Indian Federation of Fishermen Societies (SIFFS)

b) South China Sea marine capture fisheries
   - Cambodia, Indonesia, Japan, Malaysia, Myanmar, Thailand, Viet Nam
   - SEAFDEC, COBSEA, PEMSEA, ICSF, WorldFish Center

c) Aquaculture
   - Bangladesh, Cambodia, Indonesia, India, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Viet Nam
   - NACA, International Institute for Sustainable Development (IISSD), WorldFish Center.

Each group elected a chairperson to manage the working group discussions and elected/nominated a rapporteur/presenter. The rapporteur made a short summary of the work of the working groups for each of their sessions.

Table 2 Working groups for Steps 1 to 4 exercises

	Fisheries Group 1 Bay of Bengal	Fisheries Group 2 South China Sea, East Asia	Aquaculture Group
1	Hussain Sinan (MDV)	Kao Monirith (CMB)	Md. Mohiuddin (BGD)
2	Hassan Shakeel (MDV)	Panca Berkah Susila (INS)	Pich Sereywath (CMB)
3	Myint Shwe (MYA)	Junichiro Okamoto (JPN)	C. Vasudevappa (IND)
4	Muhammad Noor (PAK)	Hj Ahmad Azahari bin Ahmad (MAL)	Tri Hariyanto (INS)
5	Indra Ranasinghe (IND)	Somkiat Khokiattiwong (THA)	Kishore Upadhyaya (NEP)
6	Athkoralage Wijegunawardhana (SRL)	Pham Viet Anh (VIE)	Shiwananda Yadav (NEP)
7	Champa Amarasiri (SRL)	Heng Sotharith (CMB)	Maribeth H. Ramos (PHI)
8	Rafiqul Islam (BGD)	Koch Savath (CMB)	Lilian M. Rueca (PHI)
9	M.G. Hussain (BGD)	Sombat Poovahiranon (THA)	Pinumkarage Chandrarathne (SRL)
10	Manikfan Goidugothi (IND)		Kom Silapajarn (THA)
11	Suseno Sukoyono (INS)	Sebastian Mathew (ICSF)	Nguyen Thanh Dam (VIE)
12	Frederick Paul Budiasih Simorangkir (INS)	Danilo Bonga (PEMSEA)	U Aye Thwin (MYA)
13	U Myat Than Tun (MYA)	Magnus Torell (SEAFDEC)	Yin Yin Moe (MYA)
14	Ukkrit Satapoomin (THA)	Penchan Laongmanee (SEAFDEC)	Imtiaz Ahmed (BGD)
15	Praulai Nootmorn (THA)	Len Garces (WorldFish)	Rakesh Kumar (IND)
16	Herman Kumara (NAFSO)	Gabriella Bianchi (Resource)	Noor Hasmayana binti Yahya (MAL)
17	U.M.G. Kakmini Fernando (NAFSO)	Derek Staples (Resource)	Upali Amarasinghe (SRL)
18	Yugraj Yadava (BOBP-IGO)		SSK Haputhantri (SRL)
19	Rajdeep Mukherjee (BOBP-IGO)		Brian Davy (IISD)
20	R. Venkatesan (SACEP)		Tumi Tomasson (IECDA)
21	V. Vivekanandan (SIFFS)		Sena de Silva (NACA)
22	Simon Diffey		Maripaz Perez (WorldFish)
23	Cassandra De Young (Resource)		Patrick White (Resource)
24	Chris O'Brien (Resource)		Doris Soto (Resource)
25	Rudi Hermes (Resource)		Miao Weimin (Resource)

STEP 1: SCOPING

Introduction to Scoping – Fisheries
Derek Staples (EAF)

This is the most important step because it affects how the rest of the process will operate. The scope of the assessment should be defined by the responsible management agency – how do they want to manage the activities? The system can operate at any one of these levels:

- a subset of a fishery (either geographically separated or jurisdictionally separated);
- an entire fishery, even if this covers multiple areas/species/fishing methods; and
- a collection of fisheries.

When everyone is clear about what is being assessed, the system works much more effectively, although it must be acknowledged that the simplest assessments are those of easily identifiable fisheries. The other key factor is that it can really only work when the scope aligns fairly closely with the powers of the management jurisdiction. If you do not have the power to regulate or manage the activity, then you really cannot establish objectives or set performance levels or introduce the management arrangements to achieve these.[8] So there needs to be some reality in how large the scope of the assessment can be. To assist in defining the scope it may be useful to answer the following questions:

- What fishing methods are included (e.g. longline, purse seine, other)?
- What groups of fishers are included (e.g. all commercial, foreign, local, artisanal, sport)?
- What species are covered (just the target species or non target species)?
- What spatial area does it cover/not cover (entire EEZ; territorial waters, a depth strata, a distance from land, waters in between islands)?
- What management agencies are involved (fisheries, enforcement, customs, immigration, a fishery management body, environment etc.)?

For the purposes of this guide, any entity that is to be assessed will be called “a fishery” whether it covers a part, a whole, or a collection of activities. Effectively, for this region the two main levels have been a regional commission (e.g. at the Western and Central Pacific Fisheries Commission/Indian Ocean Tuna Commission (WCPFC/IOTC) level and an Exclusive Economic Zone (EEZ)/country/local (e.g. within country) level.

In terms of societal values, these will generally include:

- species sustainability
- species viability
- economic outcomes
- social outcomes
- food security.

Introduction to Scoping – Aquaculture
Doris Soto (EAA)

The scoping includes the establishing of the relevant geographical scales or ecosystem boundaries and the relevant stakeholders and relevant institutions within each. It is important to recognize that different issues have different geographical scales in terms of their impact. For example, those related

[8] The system does, however, provide a way to identify these issues efficiently in order to assist with opening a dialogue with other relevant parties.

with water use and modification of habitats may be relevant at the scale of a single farm or a collection of farms. Moreover, the issue of collection of seeds for the farming system may affect a whole watershed, and the issue of use of fish meal in the feeds is of global scale. In this respect the identification of issues and the scoping must go together. It is also important to consider cumulative impacts since aquaculture normally is located in a specific location in space and is subject to impacts from a variety of sources over time.

Working group discussions and report – Scoping step

Following group discussions on the scoping process, the groups provided short reports as follows:

The working group *Bay of Bengal marine capture fisheries* provided a presentation focused on coastal small pelagic fisheries in the Bay of Bengal as the management unit (Annex 4).

During the discussion following the presentation, the working group further noted that some issues with the process were identified, especially the template provided for guidance. The main problem was unclear table headings, e.g. methods, two levels of agencies, time frame. So, the main issue in this step is that the form needs to be revised.

The working group *South China Sea marine capture fisheries* highlighted their two studies on two different management units: a) multi-sectoral (with a fisheries focus) – Manila Bay, Philippines; and b) small-pelagic fisheries of Indo-Pacific mackerel in the South China Sea (Annex 5).

In the discussion following the presentation, the working group noted that they had also experienced similar problems with the template as described by the previous group. It was noted that resource users were not included in the list of information sources. This will be rectified.

The *Aquaculture* working group presented on cage farming in a semi-enclosed water body as the management unit (Annex 6).

STEP 2: ISSUE IDENTIFICATION

Introduction to Issue Identification
Cassandra DeYoung (EAF)/Patrick White (EAA)

The presenters introduced the process of “Issues Identification”, which is the second step in EAF/EAA implementation. The presenters noted that there are many common issues to both fisheries and aquaculture and although there are specific issues that need to be managed on a case specific basis, the process proposed is generic and flexible enough to be applied to any situation.

To help determine the collection of issues, a set of component trees that cover each of the three key areas of EAF/EAA (i.e. human well-being, ecological well-being, ability to achieve) has been developed (Figure 2). Each of the three key areas has a detailed generic component tree for which many of the potential issues have been included based on experiences of what issues are likely to be relevant for fisheries and aquaculture systems operating within the APFIC region. These trees are tools to help identify issues and to lower the chances of missing important issues. They also help by structuring the issues into related groups, which assists in determining their priority and developing management objectives and strategies. The generic trees presented provide a starting point to help the process of identifying what issues are relevant to the fishery and aquaculture farm being assessed.

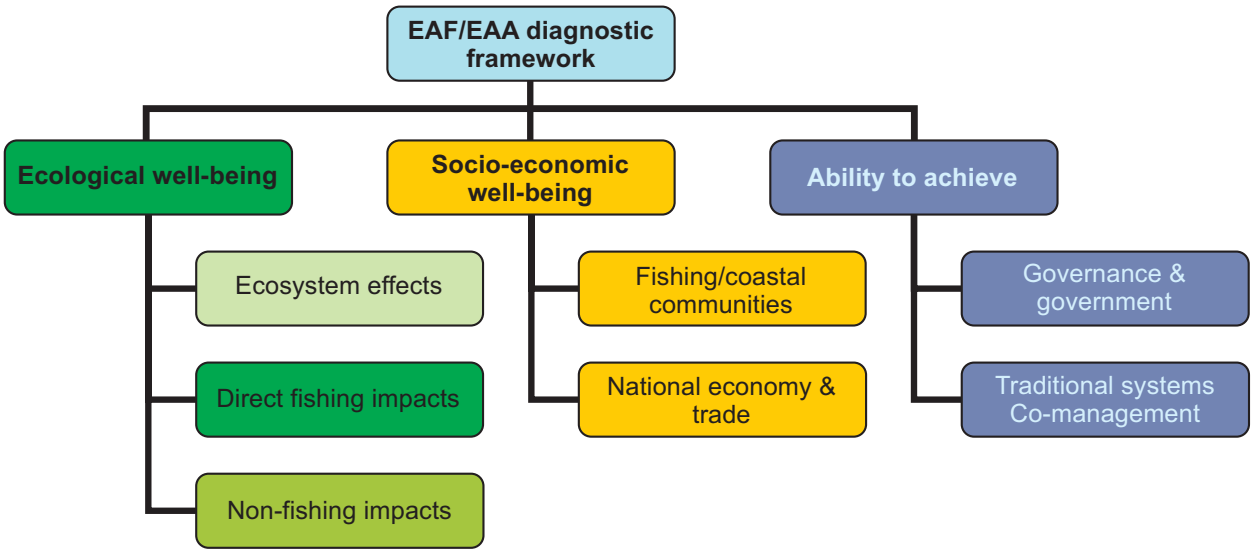


Figure 2 A generic component tree showing the three key areas and some typical main categories

Having identified the scope, the next step in the EAF process is to identify all the relevant issues (given the scope) across the five components of EAF (retained species, non-retained species, ecosystem, community and administration) for the fishery being examined. This is where it is important to have defined the scope well because it will greatly affect what issues are identified depending on whether coastal and subsistence fishing is included or not. The process can be assisted by using, and modifying, a set of "generic component trees". There is one generic component tree for each of the main components of EAF. Each generic tree has most of the types of issues that are likely to be relevant to fisheries across each of these categories irrespective of what level of fishery is being examined. This maximizes consistency and minimizes the chances of missing issues.

These are, however, only the starting point as each fishery **needs to modify** the trees to suit its individual circumstances. This can include splitting some of the issues to have greater detail, adding issues that are not there, or removing those that aren't relevant. The need to add, remove or alter the trees will depend on the fishing methods that are used, the areas of operations, the species involved and the types of communities where the fishery operates. In this case, a spreadsheet was provided to participants with the headings of each of the trees included. Each of the groups then added the issues relevant to the fishery they were working on under each of the headings.

Having identified the issues, it is important that the relevant values (sustainability, economic, social etc.) that the management agency/community wants to achieve for each of these are determined. It was outlined that these different values (i.e. is a sustainability outcome wanted or is a social value outcome more important?) can result in very different risk levels and therefore different management outcomes being generated and it is vital that these are agreed before starting the process.

Working group discussions and report – issue identification step

The issues identified by the working groups were presented in a table format but were developed as component trees (as in Figure 2). These tables were used for subsequent prioritization and action planning activities (Annexes 4, 5 and 6, Step 2). The issues identified by the groups covered the three key parts of the EAF/EAA planning framework (ecological well-being, social well-being, and ability to achieve). Although many issues were identified the list for the specific cases is far from complete as this was a demonstration exercise. It was emphasised to the workshop that the issue identification step requires full stakeholder involvement and can take a considerable amount of time as it involves a high degree of consultation.

The plenary discussion focused on the development of component trees. It was noted that at some point it was necessary to place issues into one component category/box, however, often there are linkages between different components which are not reflected in the trees. The workshop agreed that the component trees were easier to develop when fisheries are the main activity and the management (operational) unit selected is more restricted (species/gear).

The definitions used in the process may also be a problem and require discussion to ensure that stakeholders have a common understanding of common terms (e.g. “discards” refers to boats only). It is worth noting again that the issues identified may not be a complete list (i.e. it is still possible to miss issues) and it requires a relatively high-level of technology (use of computers) which may be difficult to use at local level.

The workshop noted that the component tree provides a structured framework for discussion and that it works well for stakeholders who have not thought about the broader issues involved in the case considered. All the working groups noted that the process provides a long list of issues, but that these need to be followed up with prioritization (see Step 3). Some of the issues identified by the ecosystem approach to fisheries are similar to those for the ecosystem approach to aquaculture such as community well-being and governance. However, other issues are very different. This is primarily because in many cases aquaculture is adding nutrients into the environment, aquaculture is on a permanent site where impacts can accumulate over time, and aquaculture is a new industry that is still growing rapidly and competes with other established sectors for resources.

The identification of aquaculture issues needs to consider that aquaculture will continue to grow and so has a need for new areas and that the general tendency will be to intensify production. It takes place in marine, brackishwater and freshwater ecosystems.

There is a wide range of scales from small-scale farm, clusters of small-scale farms to large farms. They are sometimes located in transboundary ecosystems. Production intensity ranges from intensive, semi-intensive to extensive systems. The trophic level of the culture species range from carnivorous, omnivorous to filter feeders and aquaculture can use feed (nutrient additive), be supplementally fed or unfed (nutrient extractive).

STEP 3: PRIORITIZATION AND RISK ANALYSIS

Prioritization and risk analysis
Gabriella Bianchi (EAF)/Doris Soto (EAA)

A large number of issues can be identified for a fishery but their importance varies greatly. Consequently, it is necessary to have some way of prioritizing the issues so that only those issues that require management receive what are usually rather scarce resources.

To determine the priority of issues and therefore the appropriate level of management response, the process uses risk analysis methods. A number of risk analysis tools can be used to assist this process. Two different tools were outlined to the participants: 1) a robust system, based on the Australian/ New Zealand (AS/NZ) risk assessment standard which is most appropriate for use with a technical group for the key ecological risks;[9] and 2) a simpler system, using the three categories directly – this is more appropriate for use within community consultation processes, but also might be useful for assessing economic and social objectives.

[9] Other formal risk analysis methods are also likely to be suitable.

All risk assessment methods work by assessing the "risk" of not meeting your objectives (which are affected by the values/outcomes wanted – see above). The category approach uses descriptions to help assess whether there is a high, medium or low risk of not achieving the objectives. The robust system works by assigning a level of consequence (impact) (from low to severe) and the likelihood (probability) of this consequence actually occurring (from remote to likely) to generate an estimate of the risk (from low to high) for each issue. In both cases only medium and high risk issues require direct management with high risk issues probably requiring additional management. In the less robust system, issues are assigned directly to these categories.

Whichever risk assessment method is used (including any that are not outlined in this guide), it must include appropriately detailed justifications for why the levels of risk were chosen. This allows other parties who were not part of the process to be able to see the logic and assumptions behind the decisions that were made. It also helps when reviewing the issue some time in the future – unless you know why you choose the levels, it will be hard to know if anything has changed that might require a shift in the risk levels and therefore management actions. This also assists in understanding the knowledge gap analyses and uncertainties.

Most importantly, these are tools to help you decide what you should and should not be spending your resources on. Thus, for issues you are ***not*** currently addressing directly, you might ask: should I continue to do nothing, or do I really need to be doing something? For issues that ***are*** currently being managed or investigated, you might ask: am I doing an appropriate amount, not doing enough, or doing too much?

Aquaculture
Doris Soto (EAA) (FAO)

It is important to define the concept of hazard in aquaculture. This would be a physical agent or event having the potential to cause harm or to impair the ability to achieve high-level objectives. These agents or events often include a biological pathogen (pathogen risk), an escaped aquatic farmed organism (genetic risk, ecological risk, invasive alien species risk), a chemical, heavy metal or biological contaminant (food safety risk), excess organic matter (eutrophication risk), the loss of a captive market (out of business risk, unemployment risk etc.).

A risk analysis typically seeks answers to four questions:

1. What can go wrong?
2. How likely is it to go wrong?
3. What would be the consequences of it going wrong?
4. What can be done to reduce either the likelihood or the consequences of it going wrong?

The risk assessment is exemplified by asking what is the risk of introducing a new disease when we buy seeds of tilapia from a neighbouring area/country in two different scenarios – one without a biosecurity framework and one with the framework well in place. The different risk levels are discussed in both cases using the likelihood/impact matrix.

The workshop participants expressed that external forces/factors also need to be addressed, and it was noted that it is possible to address external issues also and assign a risk value (consequence × likelihood). Moreover, the timeframe considered is important when doing the risk analysis.

Working group discussions and report – risk analysis

Following group discussions, the groups reported back to the workshop on their calculated risks and the problems they had in completing their tasks (group discussions and risk analysis of the issues

identified in Step 2). The groups were asked to use a risk assessment approach to prioritize their identified issues. Briefly, this was done by scoring a value for the consequence of the issue happening (*C*) and the likelihood of it happening (*L*). These values are then multiplied to get a risk value (*R*) as follows:

$$R = C \times L$$

The scales were set to 0 to 5 and 1 to 6 for consequence and likelihood respectively (Table 3), and hence the maximum score for the risk value is 30 (maximum risk) and the minimum value is 0 (minimal risk). The groups selected a few of the identified issues for each component and prioritized these issues by risk assessment (as above) and presented their results in tables (Annexes 4, 5 and 6, Step 3).

Table 3 The different levels of consequence *(C)* and likelihood *(L)* used to calculate the risk value *($R = C \times L$)* in the group exercises

Consequence (impacts)		Likelihood	
Level	**Description**	**Level**	**Description**
0 – Negligible	Very insignificant, probably not measurable against background variability.	1 – Remote	Insignificant probability of occurring.
1 – Minor	Possibly detectable but minimal impact	2 – Rare	May occur in exceptional circumstances.
2 – Moderate	Maximum acceptable level of impact.	3 – Unlikely	Uncommon, but has been known to occur either here or somewhere comparable.
3 – Severe	Above acceptable limit. Wide and long-term negative impacts.	4 – Possible	Evidence that it could occur.
4 – Major	Very serious, likely to require long restoration time to undo.	5 – Occasional	May occur.
5 – Catastrophic	Widespread and probably irreversible.	6 – Likely	Expected to occur.

Following the presentations the workshop participants noted that it could be easy to confuse the issues with the risk. Furthermore, countries may differ in risk analysis results and hence transboundary issues could be ranked differently (i.e. important in country A and less important in country B). There could be a problem with the formulation of issues (statements) which then makes it hard to assess the degree of risk if your issue is not well defined. Also, the scale of management unit could be a problem; if your unit is too broad you will not identify local issues (e.g. livelihoods for particular local fishing villages). Hence, it is very important to choose the appropriate scale for the assessment that you are carrying out. For simplicity of use in the workshop working group activities, only a four-point scale was used.

STEP 4: DEVELOPING REPORTS ON PRIORITY ISSUES

Development of the management system

Gabriella Bianchi (FAO)

The next step in the process was to develop the management system for each of the issues that required direct controls and/or investigation. The EAF process outlines a set of elements each of which needs to be completed to ensure that the management system is comprehensive and effective. These elements are outlined in Table 4.

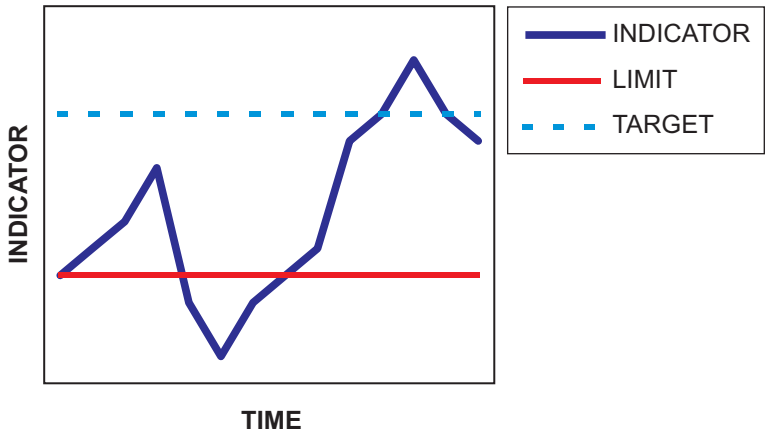
Table 4 An example of headings used in a management/action plan for three major issues (ecological well-being, human well-being, governance)

Performance Report Heading	*Description*
Fishery: **Issue:**	
1. Operational objective	
2. Justification	
3. Benchmarks (limits and/or targets)	
4. Information required (and/or available)	
5. Evaluation of performance	
6. Management response to the issue: a. Current measures b. Future measures c. Action if performance is exceeded	
7. Impacts of management measures on other issues and objectives: a. Landed species b. Discarded species c. General ecosystem d. Human well-being (community and/or national) e. Governance	
8. Comments and actions	
9. External drivers or pressures	

The three most critical elements in this system are the **operational objective** (what specifically do you want to achieve for this issue and this fishery?); the **performance measure** (what levels define acceptable performance?); and the **indicator** (how will you actually measure performance?). These three are a package; one is no value without the others.

The management responses developed should be related directly to trying to achieve each of the objectives and there should be regular reviews of progress and alterations to management where performance is not considered good enough.

It was also explained to participants how the use of indicators related to the limit and target reference points (see below).



Working group discussions and report – management system

Following group discussions on developing an operational fisheries management plan, the groups reported back to the workshop on the exercise using the methodology presented above. Each of the groups developed summary management actions for one or two of the issues that they had prioritized as being moderate or high risk. Three issues were taken by each group, these examples are presented in Annexes 4, 5 and 6, Step 4).

STEP 5: PREPARING EAF/EAA MANAGEMENT PLANS

Preparation of integrated EAF and EAA management plans

Derek Staples (EAF APFIC/FAO consultant)

All the results from Step 1 through to Step 4 need to be incorporated into an EAF management plan for the designated fishery management unit. These are the results from: scoping, identifying issues; prioritizing issues; agreeing on objectives and management measures, including agreeing on how to measure management performance. A template for the plan is provided as Annex 7 and the major headings of the plan (and derivation of the content) are:

- Overarching policy goal (from scoping exercise)
- Background (from scoping exercise)
- Major issues (from Step 2 and Step 3)
- Objectives (from Step 4)
- Management measures (from Step 4)
- Decision rules (from Step 4)
- Evaluation of management (from Step 4)
- Monitoring, control and surveillance
- Communication strategy
- Review (from Step 4).

The individual action plan developed during Step 4 is also attached to provide more detailed information on each issue.

The management plan for aquaculture

Patrick White (EAA) (APFIC/FAO consultant)

As for EAF, there must be an overarching policy goal, and it is necessary to identify the management unit with the major social, ecological and governance aspects.

Major issues must be identified and it is possible to use the trees and risk assessment as the main tool for prioritization, but it is also possible to use other forms of facilitation and identification of the causes (roots) of the major issues, such threats can be assessed against the overall objective through arisk assessment. In some ways aquaculture has different aspects to fisheries that must be considered in the management approach and plan.

Some general measures are useful to consider in the management plan. These include the conservation of and implementation of integrated aquaculture as a means to enhance organic matter utilization and to provide more social opportunities and diversify livelihoods. Incentives or enhancing mechanisms for the farming of herbivorous, omnivorous species and extractive species should be considered. The use of integrated aquaculture systems combining fed/nutrient additive species with unfed/nutrient extractive species should be encouraged.

The implementation and use of the geographical information systems for cross sectoral and watershed scale planning, the careful site selection of aquaculture zones and the design of cost-effective monitoring systems are beneficial. Another additional measure is the provision of “green infrastructure” or local conservation areas to provide a seed pool for aquaculture impacted areas. The implementation and enforcement must include the development of a road map for the process of implementation and indicators of performance to be used in the monitoring and to assist feedback and adaptive management.

Discussion on the EAF/EAA planning process

The chairperson asked participants to consider their opinions of the EAF and EAA and whether they can be integrated into the activities of member countries and organizations. The participants noted a number of important issues relating to the development of EAF/EAA:

- The basic structure of EAF/EAA was useful because of its vertical and horizontal dimensions, but there was a challenge for other agencies to use similar approaches.
- It is important to focus on common (cross-cutting) issues. By considering several issues from across the different components, the linkages of the issues became apparent, including conflicting objectives.
- The issue of differing definitions between sectors and countries can impact effective understanding, therefore common definitions of terms and jargon is important, e.g. differing understanding of sustainability versus sustainable development.
- Time scales for implementation is a problem since it can take several years and this may result in loss of momentum if staff or governments change.
- It is important to build on existing arrangements and initiatives since these are already based within the local context and can be adapted but not simply replaced.
- To ensure effective stakeholder dialogue there is a strong need for a participatory approach.
- The lack of concrete examples of EAF applications means that it remains hard to convince decision-makers of the effectiveness of the EA. Success stories are urgently needed for communication and awareness raising.
- There will be a need for further validation of the EAF/EAA methodology at the national level to allow adaptation to the local context.

EAF/EAA GENERIC TREES

Generic trees for EAF and EAA were developed based on the examples and issues discussed during the working group sessions. These generic trees (Figures 3 and 4) can be used as an example for use in EAF/EAA planning, however they would require modification to suit the fishery or aquaculture system under consideration.

Each of the branches is presented in more detail with the issues identified in Annex 8.

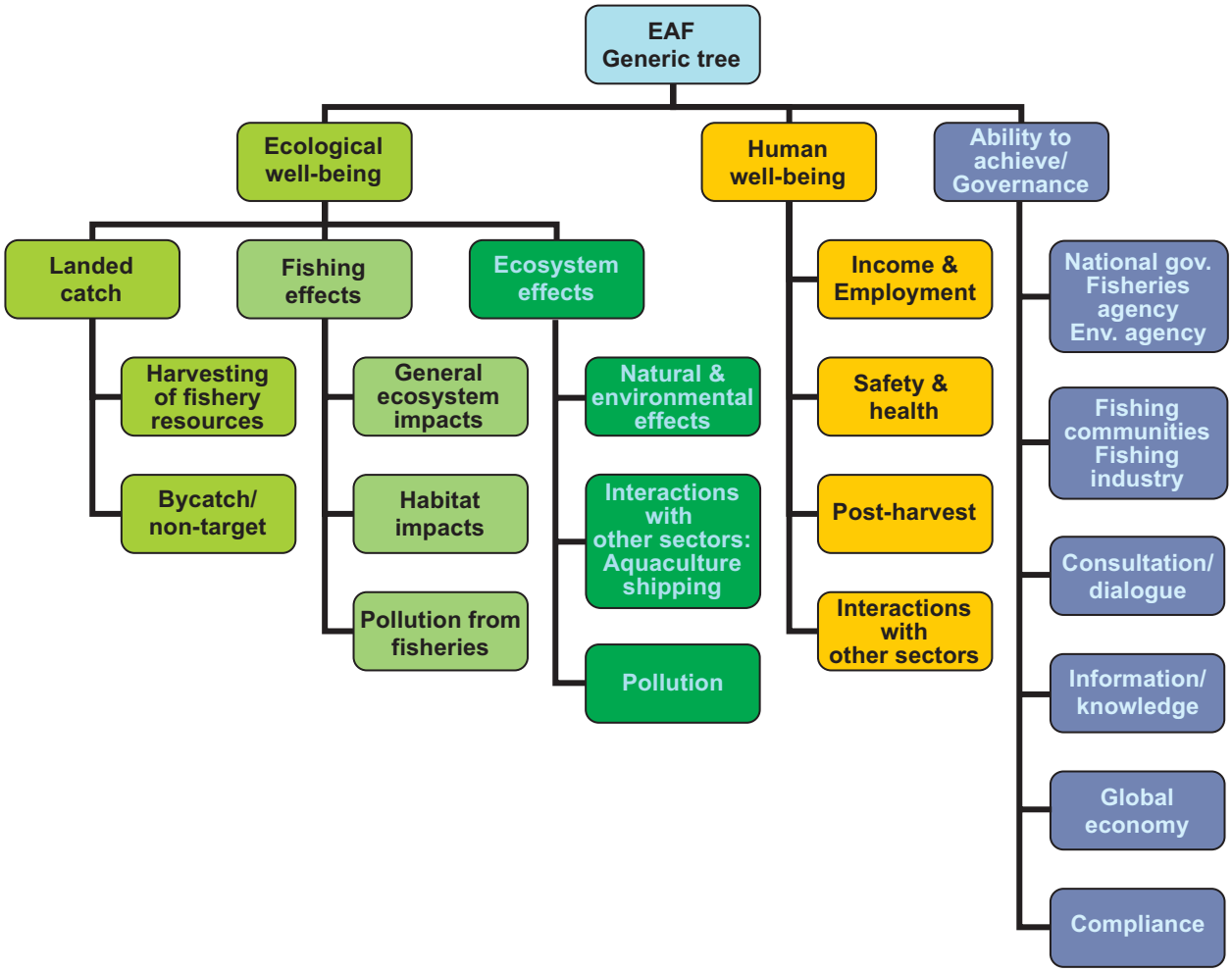


Figure 3 The EAF generic ecosystem approach to a fisheries tree developed by the workshop participants

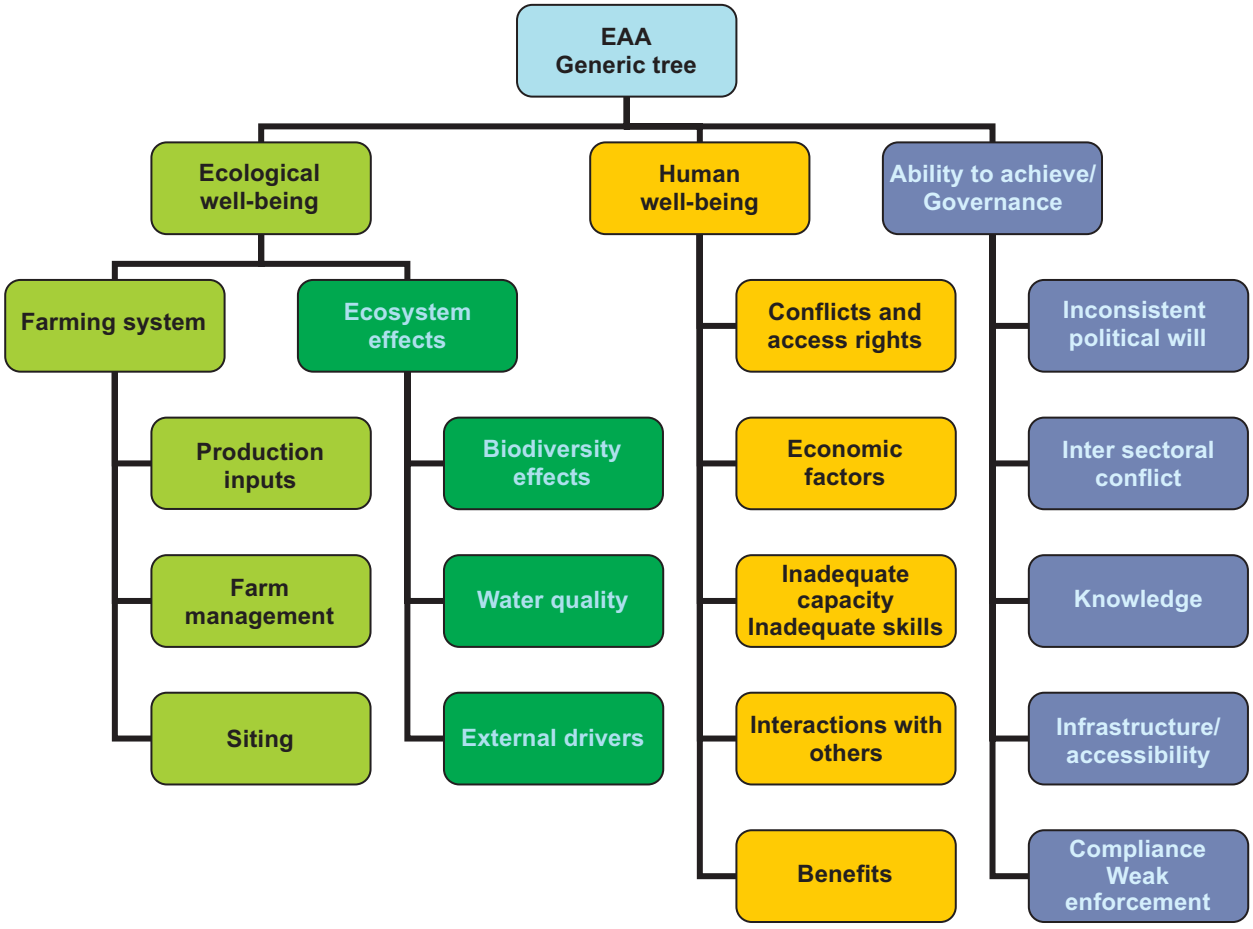


Figure 4 The EAA generic tree to the ecosystem approach to aquaculture developed by the workshop participants

APFIC PARTNER ORGANIZATIONS' EXPERIENCES WITH EAF/EAA

The APFIC sessions developed recommendations and an action plan for APFIC members and regional organizations to promote or support the implementation of ecosystem approaches to fisheries and aquaculture. The APFIC partner organizations presented their ongoing work and explained how it fitted in with the EAF/EAA.

The participating regional organizations shared their vision of how EAF/EAA may be applied at a regional level or as a basis for their organizations' work.

BOBLME (Bay of Bengal Large Marine Ecosystem Project) informed the workshop that the major objective of the BOBLME initiative – *to establish a strategic action programme to protect the health of the ecosystem and manage the living resources of the Bay of Bengal on a sustainable basis to improve the food and livelihood security of the region's coastal population* – is well-based on EAF principles. Furthermore, how the EAF framework had been applied in the development of this large-scale project and in the formulation of its activities and outputs was described. The project covers five themes: pollution and ecosystem health; fish and fisheries; governance; socio-economics; and productivity and these are used to provide information for the assessment, monitoring and management of the LME. In conformity with the EAF framework described in the current workshop, the project's development also included a process involving scoping, issue identification, prioritization and risk analysis and action planning.

BOBP-IGO presented a comprehensive review of the preparedness of its member countries (Bangladesh, India, Maldives, Sri Lanka) for implementation of an EAF in the region (Annex 9). The analysis considered six dimensions and a suite of parameters under each dimension corresponding to the existing fisheries management system in the countries. The analysis shows countries have required legal and policy support and commitments for implementation of an EAF. However, the countries are lacking in fisheries management, MCS, conservation and pollution mitigation, R&D and consultation. Overall, in the region, Maldives has a better chance of moving towards an EAF within a short time span followed by Sri Lanka, India and Bangladesh.

COBSEA/UNEP-GEF shared their vision on how EAF/EAA may be applied at a regional level through COBSEA's activities. One activity is the Green Fins activity which has addressed habitat destructive fishing/marine littering and their effects on the marine and coastal environment by organizing cleanup campaigns on coral reefs and developing an action plan on marine litter management. Lessons learned in the project were that better cooperation among stakeholders is needed, that awareness building on EAF for small-scale and commercial fisheries is needed, and that consultations with all parties concerned are needed to achieve more effective outcomes.

Furthermore, the UNEP/GEF Project entitled *Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand* has provided a comprehensive regional framework where people can work together to address common coastal environmental concerns and has provided the necessary tools that have been used to engage the various sectors effectively – from local stakeholders to national government agencies of the participating countries. A significant outcome of the joint actions among the countries bordering the South China Sea has been the development of the fisheries "refugia" concept into an operational mechanism for sustaining future demersal fish stocks in the coastal waters of the country. One specific expected outcome is strengthened cooperation in the management of the significant seagrass ecosystems in the transboundary waters between Cambodia and Viet Nam.

NACA endorsed the ecosystem approach for aquaculture and would like to see more emphasis on small-scale fisheries and small-scale marine aquaculture (which are heavily interlinked). The presentation highlighted that there would be a surge in production from inland fisheries and that this requires specific attention in the same way that EAF and ESS have been developed for marine capture fisheries and aquaculture, respectively. It was further noted, however, that inland fisheries might be more complex than marine fisheries. The presentation concluded with an example of cage culture development in volcanic lakes, where massive coverage of the lake surface with fish cages has led to problems and required management intervention.

SEAFDEC shared their vision on practical aspects of the ecosystems approach to capture fisheries management. It was highlighted that the aim at the local, transboundary or sub-regional level is the integration of fisheries management into habitat management. Furthermore, conceptually, ecosystems approaches to fisheries are fairly straightforward and it is important to ensure involvement of a range of institutions and organizations with the lead being taken by the fisheries administration. Also, building on ongoing local initiatives that know the issues was recommended, especially for regional organizations, as you seldom start from the beginning. This also saves funding and avoids overlap. There are several types of fisheries resources and environmental conservation areas existing (e.g. MPAs, refugia, closed seasons, etc.) and it is important to integrate these with good coastal planning. In all this, management of fishing capacity is an important component. Finally, there was a call for fisheries and environmental authorities to come together, focus on the ecosystems approach and start integrating fisheries management with habitat management and build up a common position to seek ways to ensure that developments in coastal (and inland) areas give due consideration to the aquatic resources and the marine environment.

WorldFish Center explained their experiences with an ecosystem-based approach to fisheries and aquaculture management in Southeast Asia. In its attempt to optimize the impact of its research efforts, The WorldFish Center has focused its research work on two major development challenges: (a) resilient small-scale fisheries (SSF); and (b) sustainable aquaculture.

A framework for diagnosis and management of small-scale fisheries has been adopted in a number of projects of WorldFish Center in the Philippines and Indonesia and includes the following five elements: (i) the external environment (ecological, social and economic processes arising from outside the domain of the fishery); (ii) a diagnosis of threats and opportunities; (iii) a management phase comprising the management constituency (the conditions and relationships for action); (iv) the management process itself; and (v) the outcomes that flow from the system.

The following WorldFish Center projects in Southeast Asia could provide a better understanding of EAF application: (1) community-based fisheries management in post-tsunami Aceh, Indonesia; (2) enhancing management effectiveness for the Calamianes Islands MPA network, Palawan Province, Philippines; and (3) strengthening governance and sustainability of small-scale fisheries management in the Philippines through an ecosystem-based fisheries management approach.

The issues of scale, governance and ecosystem-based fisheries management were noted. In addition, the need for indicators and data for monitoring and evaluation, building of a management constituency of stakeholders, and better modalities for sustaining EAF efforts were emphasized.

PEMSEA shared their vision on the ecosystem approach and highlighted the importance of integrated coastal management (ICM). PEMSEA presented some of the imperatives of an ecosystem-based approach to fisheries management and a framework for sustainable development of coastal areas through ICM implementation. It further presented that ICM is a recognized international approach and functionally is a management framework. The important activity now is to mainstream ICM and support national and local governments to plan and manage coastal areas through integrated coastal management and support government efforts to plan and manage river basins and large bays (e.g. Manila Bay) by functional scaling-up.

ICSF shared some considerations on the practical implementation of the EAF in the APFIC region. The objectives of EAF are to contribute to long-term food security and human development and to create conditions whereby fishworkers and fishing communities, including men, women and children, can enjoy their human rights, including improved working and living conditions. Different caveats of implementing EAF were presented and also some examples of EAF elements in current fisheries management measures. A stepwise approach to the implementation to EAF was presented: Step 1 – Implementing existing measures within the sector; Step 2 – Integrating traditional ecological knowledge; and Step 3 – Interagency collaboration and cross-sectoral dialogue.

Finally, coordination and cooperation of different agencies cannot materialize in a political vacuum and campaigns and the advocacy of fishers and fishing communities for the effective implementation of the EAF is necessary.

ACTION PLANNING FOR APFIC MEMBER COUNTRIES AND REGIONAL ORGANIZATIONS

The workshop was split up into the original three working groups covering fisheries in two regions, and aquaculture. The fisheries groups covered:

- Bay of Bengal (countries, plus BOBP-IGO, BOBLME, NAFSO)
- South China Sea (East Asian members, plus COBSEA, ICSF, SEAFDEC, PEMSEA, WorldFish Center)

The working groups were then requested to consider the following questions and their responses were developed into the APFIC action plan on EAF/EAA.

1. Identify key issues relating to **implementation** of EAF/EAA?
   – Is it useful? Can we use it? How should we use it?
   – What are **we already doing** that is complementary to EAF/EAA?
2. What are the priority actions?
   – Can we identify some priorities for our immediate action?
   – How can this be addressed at country level?
3. What regional options/opportunities exist?
   – What should regional organizations do as first steps?
4. What are the practical issues for implementation?
   – Lack of resources, budget capacity, political will etc.
5. Develop some milestones and indicators for countries and APFIC partner organizations.

APFIC will monitor the progress of countries or organizations on the implementation of the ecosystem approach to fisheries and aquaculture. This will be done by monitoring the milestones developed within the working groups. APFIC will specifically request member countries for feedback to the 31st Session of APFIC in the Republic of Korea in 2010.

Presentation of working group recommendations and milestones

The working groups presented the reports of their sessions and these were developed into the APFIC action plan which was discussed in plenary at the final session and was endorsed by the workshop. The action plan can be found at the beginning of this document.

WORKSHOP CLOSURE

In closing the workshop, the Secretary of APFIC informed the participants of the follow up actions which would take place concerning the writing and circulation of the workshop report and the APFIC follow up. He thanked all participants for their hard work and dedicated input to the working groups and discussions and stated that this had resulted in a practical action plan that could be followed up by member countries and APFIC partner organizations.

He thanked the Minister, Deputy Minister, Secretary and Director-General of MFAR for his support and thanked the workshop support staff of Sri Lanka, the MFAR support staff and the APFIC Secretariat, especially, for all the excellent arrangements. He also thanked the resource persons from FAO headquarters, the consultants and regional organizations for their contributions.

The Secretary of MFAR thanked the APFIC secretary and the APFIC secretariat for organizing the workshop. He further thanked all the member countries and the Minister of MFAR for their support to the workshop. He concluded by congratulating the participants for producing concrete useful results and wishing all of them a safe return home.

ANNEX I

AGENDA OF THE REGIONAL WORKSHOP ON
"Practical implementation of the
Ecosystem Approach to Fisheries and Aquaculture in the APFIC region"
18–22 May 2009, Colombo, Sri Lanka

Day 1	**Introduction to principles and practices of the ecosystem approach to fisheries and aquaculture**
08.30 – 10.15	Opening Ceremony National Anthem Lighting of the Traditional Oil Lamp Welcome Address – *Mr Indra Ranasinghe* Introductory Remarks – *Simon Funge-Smith* Inaugural Address by *Mr G. Piyasena* Address by *Hon. Neomal Perera* Keynote address – *Hon. Felix Perera* Vote of Thanks
10.15 – 10.45	*Coffee*
Objective: *Introduction to the purpose of EAF/EAA and reasons for its application. Review of country status in addressing EAF/EAA application*	
10.45 – 11.00	Workshop objectives/Agenda, adoption of agenda – *Simon Funge-Smith*
11.00 – 11.30	Why use the EAF and what are its principles – *Gabriella Bianchi*
11.30 – 12.00	Why use the EAA and what are its principles – *Doris Soto*
12.00 – 12.20	Incorporating the human and social dimensions of EAF/EAA – *Cassandra DeYoung*
12.20 – 13.30	*Lunch*
13.30 – 15.30	Country case study presentations (14 countries, 10 minutes, six slides maximum, Chaired: Miao Weimin) Bangladesh, Cambodia, India, Indonesia, Japan, Malaysia Maldives, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Viet Nam The presentations will cover the fisheries and aquaculture management issues and challenges, The will also cover interactions between the two subsectors as well as institutional type challenges
15.30 – 16.00	*Coffee*
16.00 – 16.45	Country case study presentations *(continued)*
16.45 – 17.00	Progress made by countries in the region in implementing EAF & EAA – *Derek Staples*
17.00 – 17.20	Interactions between fisheries & aquaculture – some examples of interactions in the region – *Miao Weimin*
17.20 – 17.50	Questions and answer open discussion based on the days presentations
18.30	*Poster session & hosted buffet*

Day 2	Practical application of EAF/EAA
Objective: *Introduction to the tools used in EAF/EAA and hands on activities on planning under EAF and EAA. There will be four groups based around two major regions and the subsectors of fisheries and aquaculture.*	
08.30 – 09.00	The key steps of the fisheries management and planning process under an EAF – *Gabriella Bianchi*
09.00 – 09.20	The planning and implementation process under an EAA – *Doris Soto*
09.20 – 09.40	Introduction to working group activities [presentation) group formation, and selection of case studies for practical work – *Simon Funge-Smith*
09.40 – 10.00	Step 1: Scoping Introduction to Scoping (presentation) – *Derek Staples (EAF)/Doris Soto (EAA)*
10.00 – 10.30	*Coffee*
10.30 – 12.30	Step 1: Scoping Group discussions
12.30 – 13.00	Step 1: Scoping – Groups short report (<10 mins each)
13.00 – 14.00	*Lunch*
14.00 – 14.30	Step 2: Issue identification Introduction to Issue identification (presentation) – *Cassandra DeYoung (EAF)/Patrick White (EAA)*
14.30 – 15.30	Step 2: Group discussions – Ecosystem issues identification
15.30 – 16.00	*Coffee*
16.00 – 16.30	Step 2: Group discussions – Ecosystem issues identification *(continued)*
16.30 – 17.30	Step 2: Issue identification – Groups report

Day 3	Practical application of EAF/EAA *(continued)*
08.30 – 09.00	Step 3: Prioritization and risk analysis (presentation) – *Gabriella Bianchi (EAF)/Doris Soto (EAA)*
09.00 – 10.30	Step 3: Prioritization and risk analysis – Group work Group discussions and risk analysis of the issues identified in Step 2
10.30 – 11.00	Groups report
11.00 – 11.30	*Coffee*
11.30 – 12.00	Step 4: Developing reports on priority issues Presentation – *Gabriella Bianchi/Miao Weimin*
12.00 – 13.30	*Lunch*
13.30 – 15.15	Group discussions
15.15 – 15.45	*Coffee*
15.45 – 16.15	Group report back
16.15 – 16.45	Step 5: Preparing integrated EAF and EAA management plans – *Derek Staples (EAF)/ Patrick White (EAA)*
16.45 – 17.30	Discussion on the EAF/EAA planning process [Contingency for overrun]

Day 4	Action planning for APFIC member countries and regional organizations
Objective: *The APFIC sessions, will develop recommendations and an action plan as to how APFIC members and regional organizations can promote or support the implementation of ecosystem approaches to fisheries and aquaculture. The recommendations may also include some indications of key areas of focus or particular institutional or legislative reforms required.*	
08.30 – 09.00	Introduction to the APFIC planning section – *Simon Funge-Smith*
09.00 – 10.30	Regional organizations – vision or how EAF/EAA may be applied at a regional level or as a basis for their organizations work (short since will include some/all of the following:
10.30 – 10.45	*Coffee*
10.45 – 11.00	Introduction to working groups – Bay of Bengal (countries, plus BOBP-IGO,BOBLME, SACEP, WorldFish Center) – South China Sea (East Asian members, plus SEAFDEC, PEMSEA, NACA) – *3-4 Groups cover Fisheries and Aquaculture*
11.00 – 12.30	APFIC Working Groups – Key Issues relating to EAF implementation identified – Priorities – How can these be addressed at country level – What regional options/opportunities exist? – *Practical issues for implementation – e.g. budgets, lack of authority, decentralization, the lack of a clear national roadmap to implement ecosystem type management and planning*
12.30 – 13.30	*Lunch*
13.30 – 14.30	Working groups continued
14.30 – 15.00	Short feedback session & plenary discussion
15.00 – 15.30	*Coffee*
15.30 – 17.00	Working groups – milestones and indicators

Day 5	Wrap up and conclusions
08.30 – 10.00	Presentation of working group recommendations, recommendations and milestones/ indicators Facilitated discussion.
10.00 – 11.30	*Coffee – break*
11.30 – 12.30	Presentation of the action plan Adoption of the plan
12.30	*Lunch*
Afternoon	Participants prepare for departure.

ANNEX IIA – WELCOMING ADDRESS

Mr Indra Ranasinghe, Acting Director-General,
Ministry of Fisheries and Aquatic Resources, Sri Lanka

Honourable Felix Perera, Minister of Fisheries and Aquatic Resources, Honourable Neomal Perera, Deputy Minister of Fisheries and Aquatic Resources, Dr Simon Funge-Smith, Secretary, Asia-Pacific Fishery Commission, Mr G. Piyasena, Secretary, Ministry of Fisheries and Aquatic Resources, Mr Patrick T. Evans, Resident Representative FAO, Colombo, Heads of Institutions attached to the MFAR, distinguish foreign and local participants, Distinguish invitees, members of the media ladies and gentlemen.

On behalf of Ministry of Fisheries and Aquatic Resources and the Asia-Pacific Fisheries Commission, it gives me a great pleasure to welcome all of you to this five day regional workshop on practical implementation of the Ecosystem Approach to Fisheries and Aquaculture in the Asia-Pacific Region. We in Sri Lanka are delighted to assist the Asia-Pacific Fisheries Commission joining hands with the FAO to organize this consultative workshop in Colombo

We are honoured to have with us Honourable Minister of Fisheries and Aquatic Resources as the chief guest and the Honourable Deputy Minister of Fisheries as the guest of honor. I extend a warm welcome for them to being present here despite their busy schedule especially at this crucial juncture in the country. I also welcome Chairman APFIC, Representative of FAO Secretary, Ministry of Fisheries and Aquatic Resources and the heads of the institutions.

For all other participant I extend a warm welcome. I extend an especial welcome to all the foreign delegates from the seventeen countries in the Asia and the Pacific Region who are gathered here today.

I am sure that the proceedings, discussions and debates at this five day consultative workshop will make a positive contribution towards sustainable management of fisheries.

Let me once again welcome you and wish you a very pleasant stay in Sri Lanka.

Thank you.

ANNEX IIB – OPENING STATEMENT

Mr Simon Funge-Smith, Secretary, Asia-Pacific Fishery Commission
FAO Regional Office for Asia and the Pacific, Bangkok, Thailand

As the Secretary of the Asia-Pacific Fishery Commission and on behalf of the Food and Agriculture Organization of the United Nations I thank you all for joining in this APFIC/FAO/Government of Sri Lanka Regional Consultative Workshop, "Practical implementation of the Ecosystem Approach to Fisheries and Aquaculture in the APFIC region" to be held here in Colombo, Sri Lanka, over the next five days.

Honourable Minister,

The need for applying an ecosystem approach to fisheries management is now globally accepted and has been endorsed a range of international decision-making fora. This approach to fisheries management represents a move away from management systems that focus only on the sustainable harvest of target species to management systems and decisions-making processes that balance the environmental wellbeing with human and social well-being, within improved governance frameworks. Although much of the intention is already laid out in the FAO Code of Conduct for Responsible Fisheries (CCRF), the ecosystem approach to management of fisheries and aquaculture presents a practical implementation framework where the objectives of responsible and sustainable fisheries and aquaculture can be translated into practical implementation at national and local levels.

This workshop is convened at a time where there is an increasing will to move towards more holistic fisheries and aquaculture management planning frameworks. However the practical approach and application of ecosystem based planning and management remains challenged by lack of familiarity with the approach and the need for considerable policy reform.

The 2nd APFIC Regional Consultative Forum Meeting and the APFIC 30th Session (Manado 2008) recommended that APFIC can promote understanding of how to implement ecosystem approaches to aquaculture and fisheries management. It further recommended that APFIC should promote the assessment of fisheries for their management needs. This should be done in relation to how this also effectively ensures the implementation of the FAO Code of Conduct for Responsible Fisheries. The session emphasised the need for guidance on how to apply this management approach to the small-scale production sector, the development of offshore fisheries and in the data-poor situations that prevail in the APFIC region.

This workshop has been convened in response to this request and see 75 participants from member countries across the Asian region together with representatives of Regional fisheries, aquaculture and environmental intergovernmental and nongovernmental organizations, alongside projects and other arrangements. The participants will spend five days familiarizing themselves with ecosystem approaches to management and exploring how these planning and management frameworks can be applied to the complex issues facing fisheries and aquaculture systems that are typical to the south, southeast and east Asian regions.

The participants will also be requested to work collectively to identify and prioritize issues and to build this into a list of recommendations for action directed at APFIC member countries and the regional partners of APFIC for individual or collective action.

Although these recommendations will be considered by next session of the Commission and will for the basis of monitoring of progress in the future, perhaps some of the main impacts of this workshop will be the raised awareness of participant to the potential applications of the ecosystem approach to management together with an enthusiasm and confidence to take the message home that it is possible

to use the ecosystem approach to management as the basis for notional and local planning and that this framework offers the best way to resolve the traditional obstacles of diverse objectives and complex fisheries and social interactions alongside a continually changing economic and environmental background.

Before I conclude my remarks, I would like to take this opportunity thank the Member countries, Regional Organization and Nongovernmental Organization partners, my FAO colleagues and everyone who have agreed to participate and contribute to this Regional Consultative workshop.

I particularly thank the Government of Sri Lanka and our hosts, the ministry of Fisheries and Aquatic resources for kindly hosting this meeting and their excellent arrangements in expediting our arrival and the local organizational arrangements. We appreciate that this workshop coincides with a momentous period, and that the organization and hosting of this event has been an additional burden to you, when you all have far more pressing national concerns on your minds. Our thoughts are also with you and I would like to express my personal sincere thanks to you all in this regard for your sincere efforts that will contribute to this workshops success.

Thank you all.

ANNEX IIC – INAUGURAL ADDRESS

G. Piyasena, Secretary
Ministry of Fisheries and Aquatic Resources, Sri Lanka

First of all let me welcome you all to this regional consultative workshop on “practical implementation of the ecosystem approach to fisheries and aquaculture in the Asia-Pacific region” organized by the Asia-Pacific Fishery Commission in collaboration with the Ministry of Fisheries and Aquatic Resources of Sri Lanka.

I am very grateful to the Asia-Pacific Fisheries Commission, especially to the Secretary General of APFIC for selecting Colombo as the venue for this four day workshop. As the secretary to the Ministry of Fisheries and Aquatic Resources of Sri Lanka and on behalf of my Hon. Minister & Hon. Deputy Minister and all of our staff, I am deeply honoured that we are trusted to host this important workshop in Colombo.

The Government of Sri Lanka has always been cooperating with the food and agriculture organization of the United Nation as a part of its commitment to support any effort to eradicate hunger, ensuring food security and good nutrition through the practice of agriculture, fishery and forestry. While in the field of fisheries & aquaculture, the Ministry of Fisheries and Aquatic Resources of Sri Lanka and the Asia-Pacific Fishery Commission has always been working together in concerted efforts to develop sustainable and responsible utilization of fisheries, aquaculture and related aquatic resources in the region of Asia-Pacific.

The agenda of this workshop includes number of topics where participants can focus their deliberations on practical implementation of the ecosystem approach to fisheries & aquaculture without limiting to management measures focusing only on sustainable harvest of target species.

The principles of ecosystem approach to fisheries and aquaculture are an extension of the conventional principles for sustainable fisheries development to cover the ecosystem as a whole and aim to ensure that, despite variability, uncertainty and likely natural changes in the ecosystem, the capacity of the aquatic ecosystem to produce fish food, revenues, employment and more generally other essential services and livelihood, is maintained infinitely for the benefit of the present and future generations.

In Sri Lanka under the ten year fisheries development plan (2006–2016) prepared by the Ministry of Fisheries & Aquatic Resources under the direct guidance of Hon. Felix Perera, Minister of Fisheries & Aquatic Resources, it is envisaged that the development of marine fisheries and aquaculture should base on the sustainable development goals giving due consideration to the environmental factors. Under the “Mahinda chinthanaya” i.e. lead policy document of the present government emphasizes the need to eradicate the hunger and ensure food security and good nutrition through sustainable and responsible utilization of natural resources including marine and aquaculture fishery resources.

However, we also have to remember that most of the fishermen in the region of Asia-Pacific live in subsistence level. These small and artisanal fishermen are prone to changes, they will have difficulties to understand and follow innovations in their livelihood even if it is for the betterment of their lives.

I believe that in the next few days you will be engaged in an interesting process of finding practical ways and means for implementation of ecosystem approach to fisheries and aquaculture.

I also hope that this workshop will be a fruitful and especially contribute towards the development of fisheries and aquaculture in the Asia-Pacific region.

Wish you a pleasant stay here in Sri Lanka.

Thank you very much.

ANNEX IID – ADDRESS

Honourable Neomal Perera
Deputy Minister of Fisheries and Aquatic Resources, Sri Lanka

Welcome to the newly freed Pearl of the Indian Ocean. Honourable Felix Perera, Minister of Fisheries and Aquatic Resources, Mr Simon Funge-Smith, Senior Officer Fisheries from the Regional Office, FAO, Mr Patrick T. Evans, FAO Representative of Sri Lanka, Mr G. Piyasena, Secretary, Ministry of Fisheries and Aquatic Resources, Chairmen and Directors of Agencies and Departments of my Ministry, Distinguish Country Participants, from the Asia-Pacific Fisheries Commission & International Institutions and Regional Representatives of NGOs/INGOs, and Ladies and Gentlemen.

It's an honour for me to address such a distinguish audience at a globally important Regional Consultative Workshop. Ladies and Gentlemen, at present we are facing a global economic crisis. Unemployment in the world is rising. The World Food Security is uncertain. However, fisheries have developed to become the fastest growing food production sector in the world. It has expanded, diversified, intensified and technologically advanced. Potential contribution of the fisheries to local food security and livelihoods can be very significant. As an example fisheries were an important contributor to the economy of the North and East of Sri Lanka until the onset of civil disturbances in the mid 1980s. The contribution to the national fishery production from the North and East was about 60 percent. To attain its full potential to contribute for human development and social empowerment the fisheries sector may require a favourable environment and new approaches that are achievable.

So, there is an obvious need to develop and adopt policies and practices that ensure environmental sustainability related to environmentally sound technologies and resource efficient aquaculture systems.

Ladies and Gentlemen, we all know that the ecosystems are complex and dynamic units that provide goods and services. Fisheries have direct impact on the ecosystem. Not only fisheries but also other human activities may have an impact on the ecosystem. So these activities need to be managed in an ecosystem context. Through ecosystem approach to fisheries its maximum achievement can be ensured by creating the appropriate environment for improved support to producers, enhanced participation of stakeholders, strengthened networking, better communication and regional and global cooperation.

The FAO Code of Conduct for Responsible Fisheries is important in practical implementation of the ecosystem approach to Fisheries and Aquaculture specially in the Asia-Pacific Region. At the end of this workshop a background document will be published on ecosystem approach to fisheries as a vehicle for implementation of this FAO Code. I hope this consultative workshop will achieve the set targets. I wish you all the success and request you to explore the Colombo City and suburbs during your free time and enjoy the newly freed Sri Lankans' hospitality.

ANNEX IIE – KEYNOTE ADDRESS

Honourable Felix Perera
Minister of Fisheries and Aquatic Resources, Sri Lanka

I am delighted to be the chief guest of the inauguration ceremony of the APFIC Regional Consultative Workshop on Practical implementation of the Ecosystem Approach to Fisheries and Aquaculture. As we all know, the necessity to apply an ecosystem approach to fisheries industry has become a global requirement. I hope this Workshop will assist us to make wide ranging constructive discussions on issues affecting this scope of activities in the Asia-Pacific Region.

Sri Lanka is honored to host this workshop as an executive committee member of this commission. I must extend our gratitude on behalf of the Sri Lankan government to those who proposed to hold this workshop in Colombo at the 30th session of APFIC held in Indonesia in August 2008. The APFIC, is a globally recognized regional association mandated to assist its member countries in managing their Fisheries and Aquatic Resources. Sri Lanka is privileged to be a member of APFIC which was in operation for more than 60 years in the Asia-Pacific region.

The Ten Year Development Plan for the Sri Lankan fisheries sector formulated by my ministry under the “Mahinda Chinthana” Programme has focused mainly on enhancement of fishery productions in quality and quantity, reducing post harvest losses and increasing the extraction capacity of deep sea and offshore fishery resources, while conserving coastal ecosystems to ensure sustainable fishery resource management. During last two years my Ministry has initiated number of development projects and programmes especially in the areas of infrastructure development, capacity enhancement and aquaculture development.

We were facing limitations in our marine fisheries industry for few decades due to the terrorist activities which disabled the fishing activities in two third of our coastal belt. However our valiant forces have liberated these areas from terrorism under the leadership of our President His Excellency Mahinda Rajapaksa and now we have a new challenge to develop fisheries sector in the newly liberated areas of Northern and Eastern coastal segments. In this effort I am sure that our officials will adopt ecosystem approach in developing aquaculture and marine fishing in those areas to ensure food security livelihoods of affected communities and to eradicate provincial disparities.

I welcome all our guests to our country which is a pasture of natural beauty, heritage and diverse cultures, from North to South and East to West.

I take this opportunity to invite our guests to spare their free time to observe and enjoy the beauty of our country during their stay in Sri Lanka. With this few words I declare that the APFIC Workshop on “Practical implementation of the Ecosystem Approach to Fisheries and Aquaculture” is inaugurated.

ANNEX III – LIST OF PARTICIPANTS

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ANNEX IV – CASE STUDIES OF FISHERIES (SRI LANKAN COAST)

Step 1 Scoping

SCOPE	**Coastal Small pelagic fisheries in the Bay of Bengal**
Geographic scale	Bay of Bengal
Stakeholders directly involved	Fisher (male and female), local FO, Cooperatives, boat/gear owners, Merchants/traders, local suppliers, middle men, processors, fishers NGOs, Fishing Associations.
Stakeholders indirectly involved	Local government, National government, Environmental group, Banking, MCS, academic/research institutes, consumer, tourism, coastal industry
Methods involves	Beach Seine, Purse seine, Drag nets (pelagic trawling), Gill nets, Trolling/ Hand line, Cast nets
Key objectives for the management unit	Maximizing food and livelihood security in a environmentally responsible manner
Primary agenc(ies)/groups (those who are directly involved). Those who have to take direct responsibility	Local and National Government Environmental agencies BOB-LME
Other Agencies/NGOs (those who are only indirect – or who mange related aspects) – i.e. they will not take direct responsibility	Academic Agencies MCS Tourism and other users Coastal Industry
Time scale for the management plan	Planning Process: 2-3 years Implementation: 5–8 years With annual review
Main issues associated with this management unit	• Inter Conflicts – Gear conflicts – CBO conflicts – Seasonality • Intra Conflicts – Tourism – Multiple users • Climate Change • Lack of effective planning and implementation • Lack of implementation of laws • Lack of enforcement • Coastal Pollution • Consultation issues • Shared stocks/lack of regional cooperation • Lack of public financial support • Lack of Post-harvest services • Open Access • Functional Illiteracy and Poverty issues

Step 2 Issue identification (Ecosystem issues identification) (column Issues); and

Step 3 Prioritization and risk analysis (column Risk)

ECOSYSTEM ISSUES[10]				
	Issue		**Risk**	
		Con-sequence	Like-lihood	**Risk Value**
LANDED				
Target	1. Fisheries is generally over fished	3	3	**9**
Herring	2. Use of banned gear (e.g. lights, mono fill. Gill nets and dynamites)	4	3	**12**
Mackerel	3. Impact on other fisheries by the removal of juveniles			
frigate tuna	4. Damages to coral reefs			
Anchovies	5. Turtles are at risk and dolphins			
kawakawa				
By catch				
Rays and Sharks				
Skates				
Seer fish				
marine turtles				
Dolphins				
DISCARDED				
Undersized fish				
SPECIAL SPECIES (e.g. listed by CITES, IUCN etc.)				
Turtles				
ECOSYSTEM (e.g. habitat, overall structure and functioning)				

COMMUNITY WELL-BEING[11]				
	Issue		**Risk**	
		Con-sequence	Like-lihood	**Risk Value**
FISHERS				
Fishers	Poor post-harvest practices results in low-value product	2	2	**4**
Gear Owners	Fishers receive low price	3	3	**9**
Boat Owners	Safety and Health	3	2	**6**
Processors	Restriction on fishing due to military security	4	2	**8**
Post-harvest (Women)	Inter fishery conflicts			
	Poaching			
	Lack of insurance schemes for fishers			

[10] The impacts of your activity on the ecosystem
[11] Issues relevant to the community of stakeholders

LOCAL COMMUNITY				
Households	Vulnerability to natural disasters			
Tourism	Displacement of fishing communities due to tourism and development			
Net Mending	gear based penalties			
Generates Income/ livelihood	War related impacts on fishers and communities			
Historical activity				
NATIONAL COMMUNITY				
Food security				

ABILITY TO ACHIEVE (GOVERNANCE + EXTERNAL DRIVERS)[12]				
	Issue		**Risk**	
		Con-sequence	Like-lihood	**Risk Value**
INSTITUTIONAL (e.g. legal framework, management plan, compliance, monitoring and research, availability of resources)				
	Data deficiency	3	3	**9**
	Few local level institutions	2	2	**4**
	Lack of human resources			
	Lack of scientists			
	Lack of skill enhancement programmes			
	Outdated legal instrument			
	Lack of management plans for small scale pelagic fisheries			
	High dependence on foreign finance and lack of budget allocation by the government			
	Lack of effective enforcement			
	Open Access Fishery			
CONSULTATION (e.g. existence of adequate process for stakeholder consultation)				
	Lack of information dissemination in local language			
	Political interference	3	4	**12**
	Little participation in management			
	No formal mechanism for participation			
EXTERNAL DRIVERS (e.g. coastal development, pollution, climate change etc.)				
	Climate Change	3	2	**6**
	Pollution			
	Markets/Globalization			
	Disasters			
	Variability of fuel price	3	4	**12**

[12] Issues related to existing management arrangements and to external factors that are not directly under the responsibility of a fisheries management agency.

Step 4 Developing reports on priority issues

Table: Management/action plan for three major issues (Ecological well-being, Human well-being, Governance)

Performance Report	*Description*
Fishery: SRI LANKAN COASTAL SMALL PELAGIC FISHERY IN THE BAY OF BENGAL **Issue: Use of banned gear**	
Operational objective	Minimize the usage of banned and destructive gear
Justification	• Banned by fisheries act and its supporting regulation. Banned based on socio-economic indicators • Usage of gillnetting using lights, use of mono filament and dynamites. • Gears are too efficient, aggregate juveniles and leads to conflict. • Operators are practiced or supported by politically powerful people. • Consequence to ecosystem and impact to food security is at level 4
Benchmarks (limits and/or targets)	• Sale of light bulbs used in purse seine (ring net) fishing (Target: Reduce the sales by 50 percent, Limit: Increase sales). • Number of infringements. • Number of juveniles.
Information required (and/or available)	Data on import of light bulbs. Sales receipts from local shops (sample surveys)
Evaluation of performance	At the end of 5 years based on the indicator
Management response to the issue:	
a. Current measures	Ban in place through fisheries act.
b. Future measures	• Improve and monitoring baseline data collection • Information dissemination in local language. • Improve inspection in landing sites. • Stock assessment • Alternative livelihoods for the fishermen • Establish formal consultative process
c. Action if performance is exceeded	Needs more elaboration
Impacts of management measures on other issues and objectives:	
d. Landed species	• Reduced number of juveniles in catch. • Increased catch of gill netters and other gears (CPUE) • Improved quality of catch • Temporary reduction of ring net catches (CPUE)
e. Discarded species	
f. General ecosystem	
g. Human well-being (community and/or national)	• Gear shift will influence other gear users • Market chains will need to adapt • Positive and negative impact on community food security • Changes in distribution of wealth • Alternative practices by fishermen
h. Governance	• Aggravates enforcement issues • Aggravates the institutional issues • Improves information dissemination • Impact on budgetary Implications (cross cutting) • May improve public debate leading to transparency and judiciary support • May lead to increased conflicts
Comments and actions	Many assumptions
External drivers or pressures	• Political interference • International pressure • Open Access • Adaptive policy

Step 5 Preparing integrated EAF and EAA management plans

ANNEX V – CASE STUDIES OF FISHERIES (MANILA BAY)

Step 1 Scoping

Criteria:

- fishery/area
- levels (large – small)
- involves several countries
- national issue/problem (e.g., sustainable exploitation of resources)
- shared stocks (or issues) trans-boundary
- multiple issues (fisheries, environmental, socio-economic, governance)
- Fisheries agency – responsible agency
- Multisectoral (with Fisheries focus) – Manila Bay, Philippines.
- Small-pelagic (in the South China Sea)

SCOPE	**Manila Bay (multisectoral)**
Geographic scale	Multisectoral (with Fisheries focus) – Manila Bay, Philippines (medium scale)
Stakeholders directly involved	• Fishers • (Aquaculture farmers • Shipping • Industries • Tourism • Consumers • Market chain)
Fishing methods	Multigear (hook and line, trawl, gill net) (Aquaculture, cage)
Key objectives for the management unit	Sustainable development
Information providers	• Bureau of Statistics • Universities • Fisheries agency, Environment agency
Primary agenc(ies)/groups (those who are directly involved). Those who have to take direct responsibility	Fisheries agency
Other Agencies (those who are only indirect – or who manage related aspects) – i.e. they will not take direct responsibility	• Environment • Land • Tourism • Local (municipal, provincial, Fisheries Management Councils) • Navy • PEMSEA • Foundations (including business, environmental) • NGOs (Fisheries Associations)
Time Scale(s) for this assessment process	1-2 years (need to arise Awareness)
Time scale for the management plan	5 years (reporting every second year)
Main issues associated with this management unit	

SCOPE	Indo-Pacific mackerel
Geographic scale	Small-pelagic fisheries (in the South China Sea)
Stakeholders directly involved	Industrial fishers Small-scale fishers
Fishing methods	?
Key objectives for the management unit	Sustainable development
Information providers	SEAFDEC, FAO, National agencies
Primary agenc(ies)/groups (those who are directly involved). Those who have to take direct responsibility	Fisheries agencies form each country (representation) Regional agencies (SEAFDEC/FAO) Regional coordination unit
Other Agencies (those who are only indirect – or who manage related aspects) – i.e. they will not take direct responsibility	INGOs (WWF, TRAFFIC) Trade
Time Scale(s) for this assessment process	Probably long time needed
Time scale for the management plan	Probably long time needed
Main issues associated with this management unit	

Step 2 Issue identification (Ecosystem issues identification) (column Issues); and

Step 3 Prioritization and risk analysis (column Risk)

ECOSYSTEM ISSUES[13]				
	Issue		**Risk**	
		Con-sequence	Like-lihood	**Risk Value**
LANDED				
High value formula	Depletion	4	4	**16**
Mixed species	Decline in landed species	2	4	**8**
	Increased catch of juvenile fish?			
DISCARDED				
SPECIAL SPECIES (e.g. listed by CITES, IUCN etc.)				
Sea turtles	Catch of endangered species by fishing gear	3	4	**12**
Sharks				
ECOSYSTEM (e.g. habitat, overall structure and functioning)				
trophic level	changes in species composition/structure	3	4	**12**
dynamite/cyanide fishing		3	4	**12**
habitat destruction	bottom trawling	2	4	**8**
loss gear (ghost fishing)				
antifouling (fishing boat)	paint			
waste disposal (oil)	oil pollution			
fish processing	water pollution			

[13] The impacts of your activity on the ecosystem

COMMUNITY WELL-BEING[14]				
	Issue		**Risk**	
		Con-sequence	Like-lihood	**Risk Value**
FISHERS (and fish processing)				
income	income from fishing declining	4	4	**16**
work related	safety			
food	food security and nutrition	2	2	**4**
	food poisoning (algal bloom)			
gender	loss of work opportunities			
well-being				
employment	Gender issue	4	4	**16**
LOCAL COMMUNITY (Non fishery)				
food health	access to food	2	2	**4**
Interaction with other sectors	tourism, industry			
employment	Gender issue	4	4	**16**
food	food security and nutrition	2	2	**4**
NATIONAL COMMUNITY				

ABILITY TO ACHIEVE (GOVERNANCE + EXTERNAL DRIVERS)[15]				
	Issue		**Risk**	
		Con-sequence	Like-lihood	**Risk Value**
INSTITUTIONAL (e.g. legal framework, management plan, compliance, monitoring and research, availability of resources)				
Policy and regulatory	Coastal strategy – in fisheries			
Management Plan	? (CRM plans are available at the local level)			
Compliance	compliance and law enforcement issues	4	4	**16**
Monitoring and reporting	difficulty on monitoring and reporting			
Human resource capacity	lack of fishery officer at the local level			
Financial resources	Poor allocation of financial resources	2	3	**6**
Institutional building	capacity building			
Traditional management system (Sasi, Panglima laut)				
CONSULTATION (e.g. existence of adequate process for stakeholder consultation)				
Industry (councils)	coordination and fisheries councils			
Community	fisheries management councils			
Inter-agency	lack coordination and voice of fishermen	2	2	**4**
Research	linkage of research to management, use of traditional knowledge	4	2	**8**
Politics	power, jurisdictional			
Conflicts	between small-scale and large-scale	3	3	**9**
Institutional mechanisms	lack of regular consultative mechanisms			

[14] Issues relevant to the community of stakeholders

[15] Issues related to existing management arrangements and to external factors that are not directly under the responsibility of a fisheries management agency

EXTERNAL DRIVERS (e.g. coastal development, pollution, climate change etc.)				
climate change	sea level rise (based on current studies)	2	1	**2**
red tides (algal bloom)	fish kill			
transport sector	pollution and waste disposal, ballast water (exotic species)			
typhoons	intensifying and increase in frequency			
industries	pollution	4	4	**16**
human settlements	organic pollution			
aquaculture	fish escapes	2	2	**4**
	habitat destruction			
	pollution			
	price			
Reclamation	habitat destruction (mangrove), reduction of fishing areas	2	3	**6**

Step 4 Developing reports on priority issues

Table: Management/action plan for three major issues (Ecological well-being, Human well-being, Governance)

Performance Report	*Description*
Fishery: Manila Bay **Issue: Depletion of fish stocks**	
Operational objective	rebuild stocks levels
Justification	risk level 16, information on catches, scientific trawls...
Benchmarks (limits and/or targets)	• target: stock levels as in 1995 (CPUE) • limit: no less than current levels
Information required (and/or available)	Trends in catches and effort, number of fishers, biomass
Evaluation of performance	comparing indicator vs. benchmarks
Management response to the issue: a. Current measures b. Future measures c. Action if performance is exceeded	 Trawl ban, mesh size regulations Limit the amount of fishing, user rights Revise strategy
Impacts of management measures on other issues and objectives: a. Landed species b. Discarded species c. General ecosystem d. Human well-being (community and/or national) e. Governance	• People displaced from fishing • Risk that the future benefits resulting from stock recovery will go to other groups
Comments and actions	• Fisheries may not be a major cause of stock depletion • The assumption of Manila Bay being a closed system needs to be considered • Jurisdictional issues in relation to monitoring and control of trawl fisheries
External drivers or pressures	• Climate change • Pollution • Land reclamation

Issue: *Poor compliance*	
Operational objective	Implementation of laws, rules and regulations
Justification	High risk level (16)
Benchmarks (limits and/or targets)	• target: 90 percent compliance within 10 years • limit: 50 percent compliance
Information required (and/or available)	# of conflicts, complaints, arrest, list of rules and regulations
Evaluation of performance	comparing indicator vs. benchmarks
Management response to the issue:	
a. Current measures	Local enforcement, Interagency task
b. Future measures	Decentralization and self-policing; clearly identified responsibilities; engage politicians at different levels to review responsibilities
c. Action if performance is exceeded	Revise strategy
Impacts of management measures on other issues and objectives:	positive, if the law is enforced
a. Landed species	
b. Discarded species	
c. General ecosystem	
d. Human well-being (community and/or national)	
e. Governance	
Comments and actions	• Fishers involved in monitoring • Need for adequate human and financial resources for MCS
External drivers or pressures	Corruption Turnover of staff
Issue: *Loss of employment opportunities*	
Operational objective	provide alternative employment
Justification	High risk level (16)
Benchmarks (limits and/or targets)	• Indicators: level of unemployment in coastal communities • target: level of unemployment in coastal communities less than national level • limit: ?
Information required (and/or available)	Detailed employment data. Gender disaggregated employment data
Evaluation of performance	comparing indicator vs. benchmarks
Management response to the issue:	
a. Current measures	Training provided, Linkages between institutions, credit support
b. Future measures	Social security net (unemployment benefits); linkage between institutions, credit support; improve education standard
c. Action if performance is exceeded	Revise strategy
Impacts of management measures on other issues and objectives:	
a. Landed species	
b. Discarded species	
c. General ecosystem	
d. Human well-being (community and/or national)	
e. Governance	

Comments and actions	This is a very complex issues, the fisheries department cannot deal with this issue on its own. Links needed with Department of Trade and Industry, Department of Labour, Ministry of Welfare
External drivers or pressures	Macro-economic performance
Issue: *Pollution (water quality waste, disposal, siltation, heavy metals)*	
Operational objective	maintain coastal and marine environment standards consistent with national standards
Justification	High levels of pollution affect the resources and the people, High risk level (16)
Benchmarks (limits and/or targets)	• Indicator(s): Concentrations of pollutants, sanitation facilities • Target: concentrations of pollutants do not exceed standards • Limit: ?
Information required (and/or available)	environmental water quality monitoring data; bioaccumulation studies, data on sanitation facilities
Evaluation of performance	positive improvement of coastal and marine environment based on indicators
Management response to the issue: a. Current measures b. Future measures c. Action if performance is exceeded	 National environmental standards; consultative mechanisms Strengthen ICM consultative mechanisms; media exposure; polluter pays (court cases); awareness raising. mobilize public
Impacts of management measures on other issues and objectives: a. Landed species b. Discarded species c. General ecosystem d. Human well-being (community and/or national) e. Governance	
Comments and actions	The fisheries department should acknowledge that pollution is part of their responsibility. Consultative processes should ensure fair outcomes
External drivers or pressures	National environment policy.

Step 5 Preparing integrated EAF and EAA management plans

ANNEX VI – CASE STUDY AQUACULTURE

Step 1 Scoping

Management unit: Cage farming in semi enclosed water body

Higher objective

a. Long term sutainable and responsible fish production for livelihoods, food security and environmental integrity

Stakeholders

b. Direct
    i. Cage farmers or owners
    ii. Farm workers
    iii. Local governments
    iv. Small-scale capture fisheries
c. Indirect
    i. Services: feed people, transport, control the price, support
    ii. Small-scale capture fisheries
    iii. Catchment stakeholders, agriculture, forestry
    iv. Water management people
    v. Electricity production needs
    vi. Downstream farmers
    vii. Tourisms
    viii. Local government bodies
    ix. Money lenders
    x. Research institutions
    xi. Consumers local consumers

Agencies:There are different scales of authority

a. Water management authority, catchments authority
b. Power/irrigation authority
c. Joint district authorities
d. District authorities
e. Environmental agency
f. Fisheries and aquaculture institutions
g. Community voice/representation (local voice) NGOs
h. Not directly related in decision-making, no direct management or authority
i. But they have influence on civil society and facility processes and decision-making

Time scale – Time scales

a. To develop the plan
    xii. In some cases the EAA as a process will take 3 to 5 years if staring from scratch. IN other cases where there are some advances it may take 1 to 3 years
b. **Time for implementation**; longer term, and periodical revision/s every 5 years?? Annually???

Step 2 Issue identification (Ecosystem issues identification) (column Issues); and

Step 3 Prioritization and risk analysis (column Risk)

Cage culture in semi-enclosed water bodies (lake, lagoon, enclosed bay)

ECOSYSTEM ISSUES[16]				
	Issue	**Risk**		
		Con-sequence	Like-lihood	**Risk Value**
Improper Siting	Improper siting of cages	4	3	**12**
	Carrying capacity estimation	3	1	**3**
Water quality	Water quality	4	3	**12**
	Pollution from other sectors	3	2	**6**
	Organic accumulation	3	2	**6**
Technology	Inappropriate technology	4	3	**12**
Catchment and hydrography	Correct catchment features	3	2	**6**
	correct bathymetry	1	1	**1**
	Correct hydrograph	2	1	**2**
Species	Inappropriate species selection	4	1	**4**
Biodiversity Impacts	Impact on natural fishery	2	2	**4**
Poor quality management	Transfer of disease from cultured to wild	3	2	**6**
	Pollution from the sector	3	2	**6**
Habitat destruction	Habitat destruction	2	1	**2**
Poor feed management	Poor feed quality	3	3	**9**
	Poor seed quality	3	3	**9**
Improper Siting	Improper siting of cages	4	3	**12**
	Carrying capacity estimation	3	1	**3**

[16] The impacts of your activity on the ecosystem

COMMUNITY WELL-BEING[17]				
	Issue	**Risk**		
		Con-sequence	Like-lihood	**Risk Value**
LOCAL COMMUNITY				
Conflicts and access rights	conflict with grassroot stakeholder	3	3	**9**
	Access rights			
	resource use conflicts			
	Reduced fishing activities			
	User rights conflicts			
	Reduced fishing activities			
	Operational conflicts			
Economic factors	Economic income imbalance between famer and fisher	3	4	**12**
	employment opportunities			
	Lack of capital investment			
	lack of market opportunities			
	Inadequate marketing			
	Unequal benefit sharing			
	Labour issues			
Disease and fish kills	Disease	2	4	**12**
	Fish kills			
Capacity	Inadequate capacity	2	3	**6**
	Inadequate skills			
Operational conflicts	Conflicts between fisher and farmer			
Community attitude	Wrong community attitude	3	2	**6**
Food safety	Food safety issues	2	2	**4**
Poaching	Theft from cages	3	3	**9**

[17] Issues relevant to the community of stakeholders

ABILITY TO ACHIEVE (GOVERNANCE + EXTERNAL DRIVERS)[18]				
	Issue	**Risk**		
		Con-sequence	Like-lihood	**Risk Value**
Governance				
Inconsistent political will	Strong centralization	2	2	**4**
	Poor intervention	2	2	**4**
	improper intervention	3	3	**9**
	Improper coordination	3	3	**9**
	Lack of certification	3	3	**9**
	Lack of insurance	4	4	**16**
	poor planning and management	3	2	**6**
	Lack of financial support	3	3	**9**
Inter-sectoral conflict	Conflicts between institutes	3	2	**6**
	Conflict between sectors	3	3	
	Lack of governance, facilitation	3	3	**9**
	Lack of marketing	3	3	**9**
	Inconsistent institutional support	3	2	**6**
	Strong centralization			
	Poor planning			
	Conflicting sector policy			
Knowledge needs	Lack of information	3	3	**9**
	Lack of communication	3	3	**9**
	Lack of training	3	3	**9**
	Lack of BMPs	3	3	**9**
	Lack of awareness	3	3	**9**
	Lack of human resources	3	3	**9**
Infrastructure issues	Lack of accessibility, roads, market technology	3	3	**9**
	Lack of facilities	3	3	**9**
	Poor infrastructure	3	3	**9**
	Bad urbanization	2	2	**4**
EXTERNAL DRIVERS (e.g. coastal development, pollution, climate change etc.)				
Natural	fish kills	4	2	**8**
	Typhoons			
	Natural calamities			
	Climate change			
Trade Market	Export	3	2	**6**
	Local	2	2	**4**
Exports		3	2	**6**

[18] Issues related to existing management arrangements and to external factors that are not directly under the responsibility of a fisheries management agency

Step 4 Developing reports on priority issues

Table: Management/action plan for three major issues (Ecological well-being, Human well-being, Governance)

Performance Report	*Description*
Fishery: Indonesia cage culture in reservoirs	
Issue: The Indonesian farmer's impounded three reservoirs, people displaced, they decided to give people the opportunity for cage farming. Good science was done and they worked out the optimum number of cages, cage sizes. But they did not work out the siting, but when cages started they became very lucrative and popular. Culturing carp and tilapia. Too many people started to come including rich people from out side that built more cages intensified to get big profits. Within five years the production per cage went down and that started to have fish kills but rich cage farmers could go on with other business but the fishermen did not have other options. These are: intersectoral issues; water quality; conflict in resource user	
Operational objective	To achieve sustainable cage farming and capture fisheries in the lake
Justification	the get food production livelihoods opportunities for both cage farmers and fishermen; maintain and improve the livelihood
Benchmarks (limits and/or targets)	Bring back water quality of lake to have sustainable cage production within 3–5 years This will reduce fish kills which will • reduce risk to livelihoods • reduce risk to wild fisheries • reduce conflict between farmers and fishers Trade off standards of water quality for that allows cage aquaculture but does not compromise primary production for wild fisheries
Information required (and/or available)	**Ecology** Siting of the cages Ecological carrying capacity for lake to assimilate organic matter Maximum phosphorus the lake can assimilate Number of cages, fish production Nitrogen and phosphorous production from cage culture Water quality parameters to measure, Oxygen, chlorophyll Volume and Area of lake Limnology of lake – bathymetry Hydrology – turnover rate Appropriate production systems and species **Fisheries** Historical catch rates and trends Wild species composition Wild fisheries requirement No of fishermen Biological characteristics of wild fish Number and types of fishing **Social** Number of fishers, socio-economics Communities dependent on water Poaching **Stakeholders** Involve fishermen in farming. Have a interest in farming. Training to farmers and fishermen Department of Energy Department of Irrigation

	Research Institute Local leaders Fisheries agency Community leader
Evaluation of performance	**Environmental indicators** Production per unit in cages Fisheries harvest Fish growth rate Parameters of water quality, Nitrogen, phosphorous, water Transparency Number of fish kills Number of disease outbreaks Unusual Mortality **Social indicators** Fishermen income level Reduction in poverty Reaching milestones **Monitoring group, a committee for the management of fishery sector in the impoundment (money from licenses or percent of fry cost)** By technician Farmer collects information Fishermen
Management response to the issue:	Identify which Primary agency is water body (dam) owner (Energy, Irrigation) Negotiate with water body management agency and other Agencies (Department of Environment) permission for aqua of fishing licenses Once gets aqua and fishing rights Management plan initiated by Department of Fisheries Start management plan Stakeholder meeting Stakeholder consultation Lake management committee Once Carrying capacity known Alternative solutions developed organize individual stake holder meeting organize multi stake holder meeting co-management plan management committee **Regulations** Lease length License permit issuance Control of license number Stocking density Feed quality **Biosecurity frame work** Disease free seed **Institutional coordination** Environment, Fisheries line agency

	monitoring **enhance political will** Contact with Governor Ministry **Capacity building** for farmers Better Management practices **Regulations** to stop large farms from starting up Need for **Law enforcement** All measures have a cost – so need cost effective measures Need for funding revenues
a. Current measures b. Future measures c. Action if performance is exceeded	
Impacts of management measures on other issues and objectives: a. Landed species b. Discarded species c. General ecosystem d. Human well-being (community and/or national) e. Governance	**Ecosystem Issues** Organic disease and fish kill Habitat destruction Food safety **Governance** Infrastructure **Socio** Social harmony Knowledge Economic factors Community attitudes
Comments and actions	
External drivers or pressures	Climate Change – temperature, rainfall pattern Market prices Marine fisheries affects freshwater fish prices Natural calamities, floods, typhoon Global economy Political will Community attitude Fuel prices Feed prices

Step 5 Preparing integrated EAF and EAA management plans

ANNEX VII – MANAGEMENT PLAN

OVERARCHING POLICY GOAL

High-level policy goal

BACKGROUND

Management Unit

Area of operation of the fishery, jurisdiction and ecosystem “boundaries”

History of fishing and management

Brief description of the past development of the fishery in terms of the fleet, gear, people involved etc.

Descriptions of fishing activity, resources

Description of resource (target species and by-product)
Description of the aquatic ecosystem in which the fishery occurs
Description of fleet types or fishing categories

Ecological aspects

Details of critical environments, particularly sensitive areas

Social, economic and governance aspects

Social and economic benefits, both now and in the future
Description of stakeholders and their interests
Description of other uses/users of the ecosystem
Consultation process leading to the plan and ongoing consultative arrangements
Details of decision-making process, including recognized participants

MAJOR ISSUES

Ecological issues

Fishery resources and general environmental issues including both the impact of the fishery on the environment and the impact of the environment on the fishery

Social and economic issues

Issues for the people involved in fishing, the general public and at the national level, including gender issues.

Governance issues

Issues affecting the ability to achieve the management objectives in terms of constraints to stakeholder consultation/participation and the ability to manage.

OBJECTIVES

Objectives, indicators and bench marks (performance measures) to address the high priority issues, covering:

- Fishery resources (landed and discarded)
- Environment (including by-catch, habitats, prey protection, biodiversity, etc.)
- Social (Food security, poverty, conflicts, food safety, gender etc.)
- Economic (Income, profit, subsidies etc.)

MANAGEMENT MEASURES

Agreed measures to achieve all objectives within agreed time frame.
Nature of rights granted in the fishery and details of those holding the rights

MONITORING, CONTROL AND SURVEILLANCE

Arrangements for ongoing monitoring, control, surveillance and enforcement

DECISION RULES

Pre-agreed rules for applying management measures (if possible)

EVALUATION OF MANAGEMENT

Most recent status of resources including, critical by-catch species, using agreed indicators and performance measures
Status of the aquatic ecosystem, using agreed indicators performance measures
Social and economic analyses using agreed indicators and performance measures

COMMUNICATION

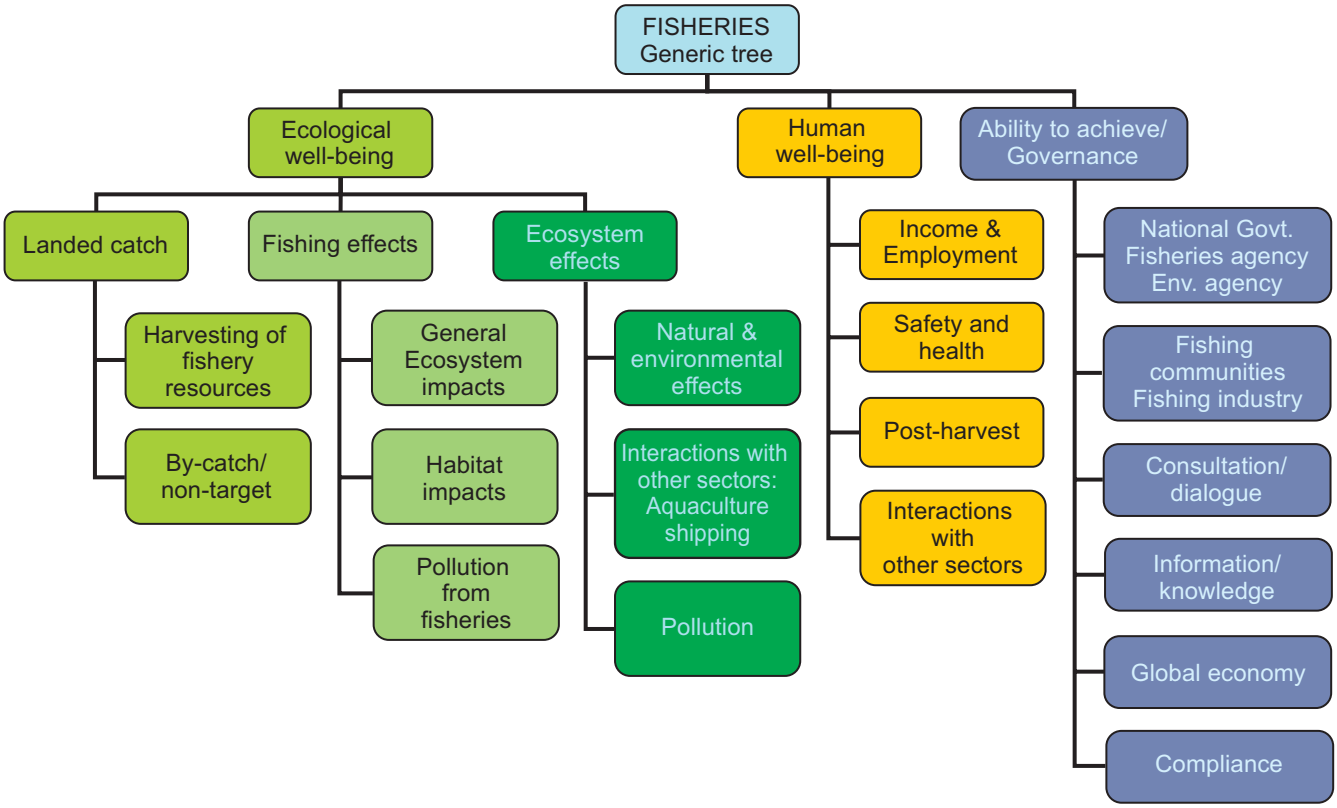
Communication strategy
Details of any planned education and training of stakeholders

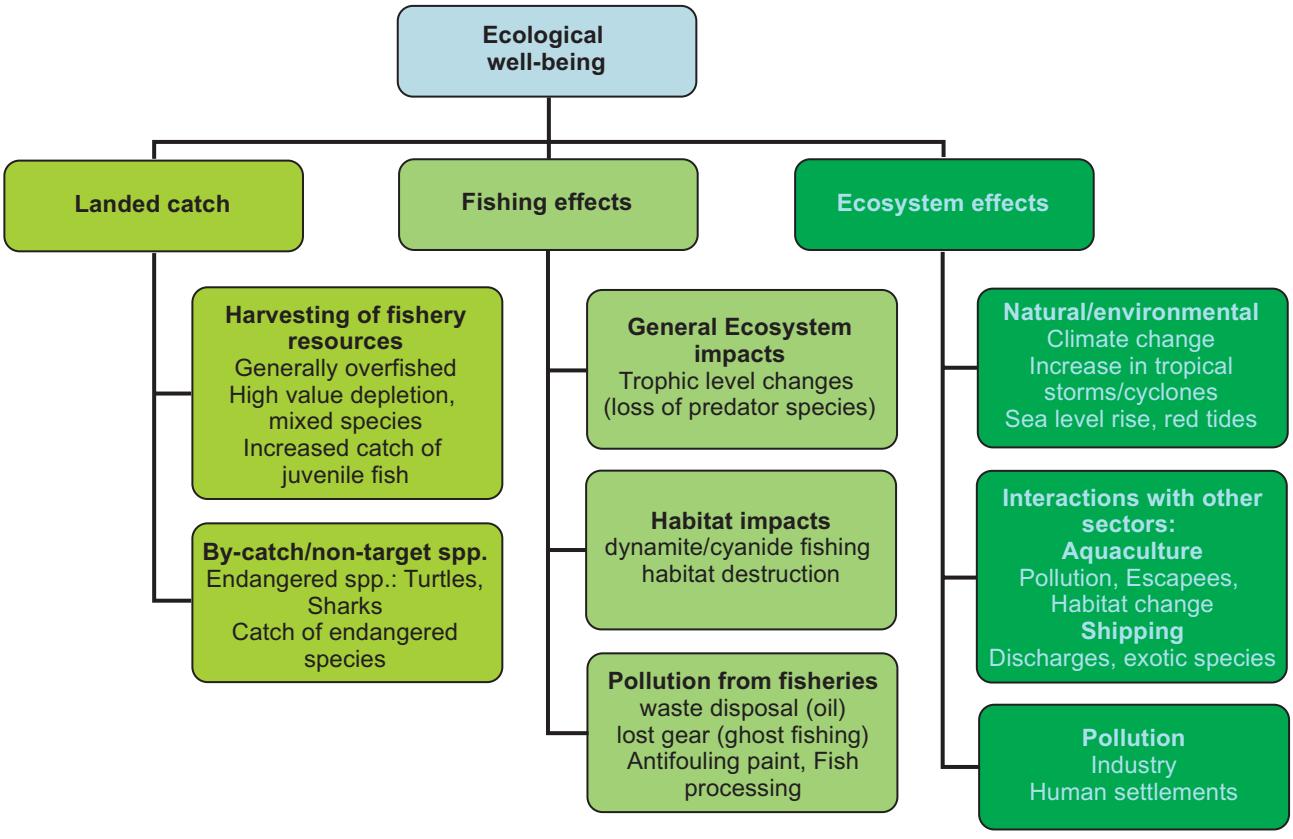
REVIEW

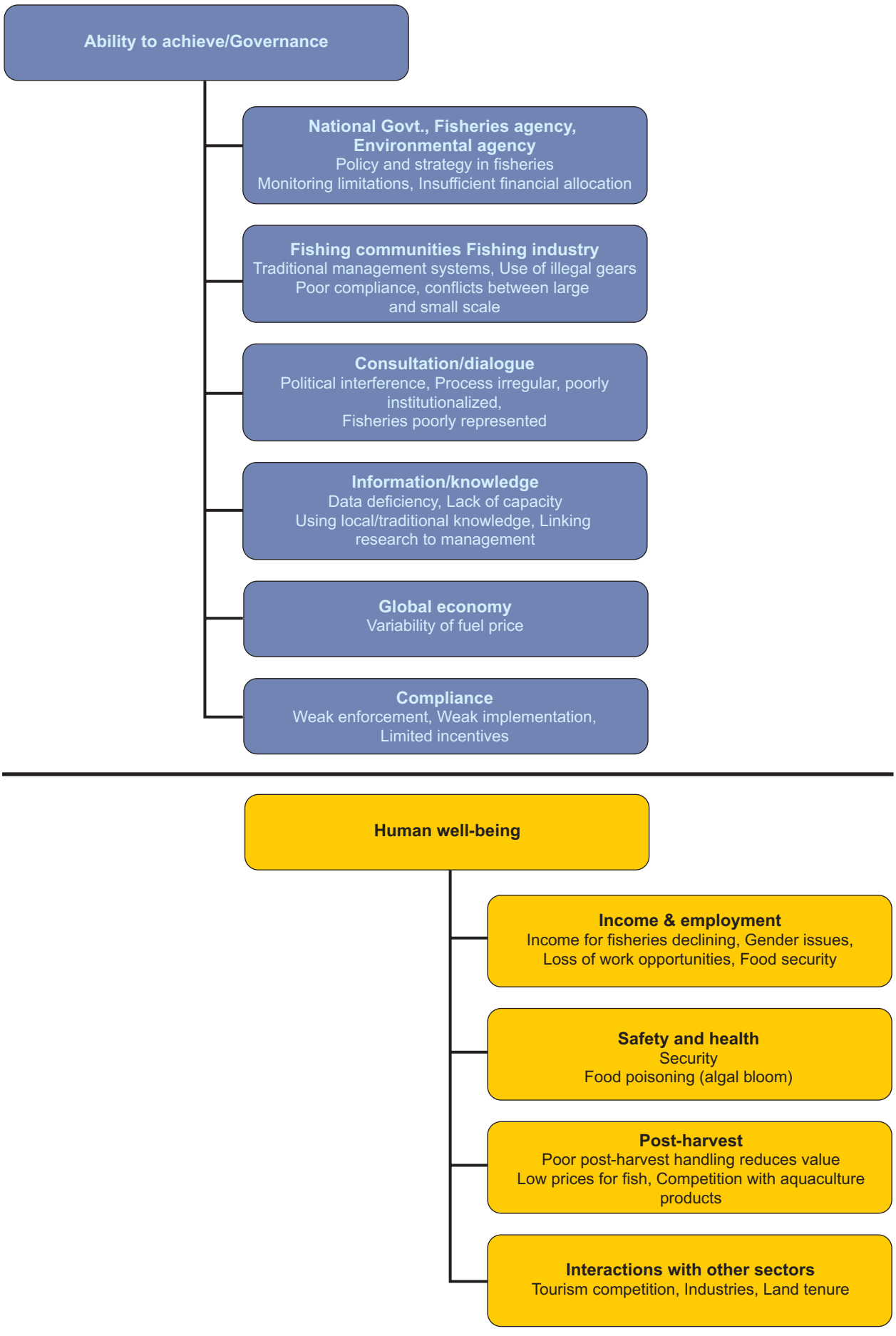
Date and nature of next review(s) and audit of performance of management

ANNEX VIII – GENERIC TREES EAF/EAA

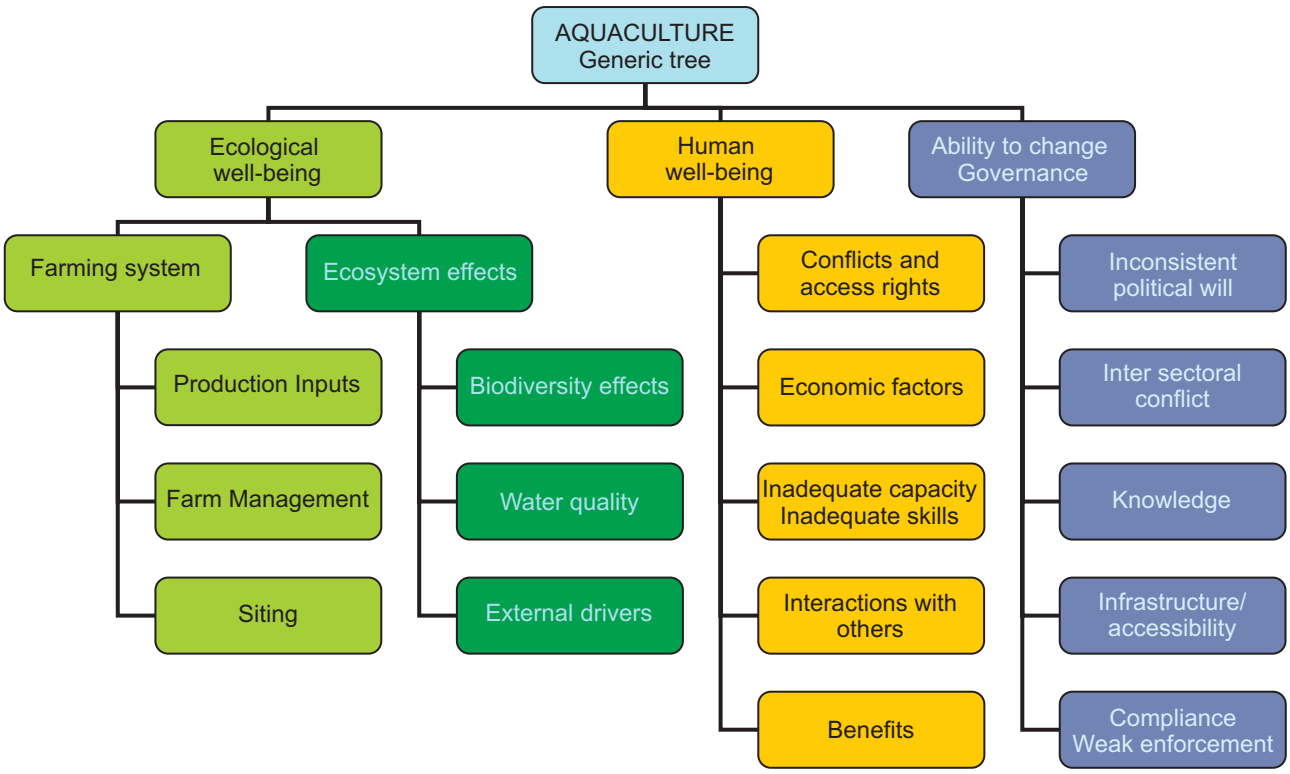
GENERIC TREE – FISHERIES

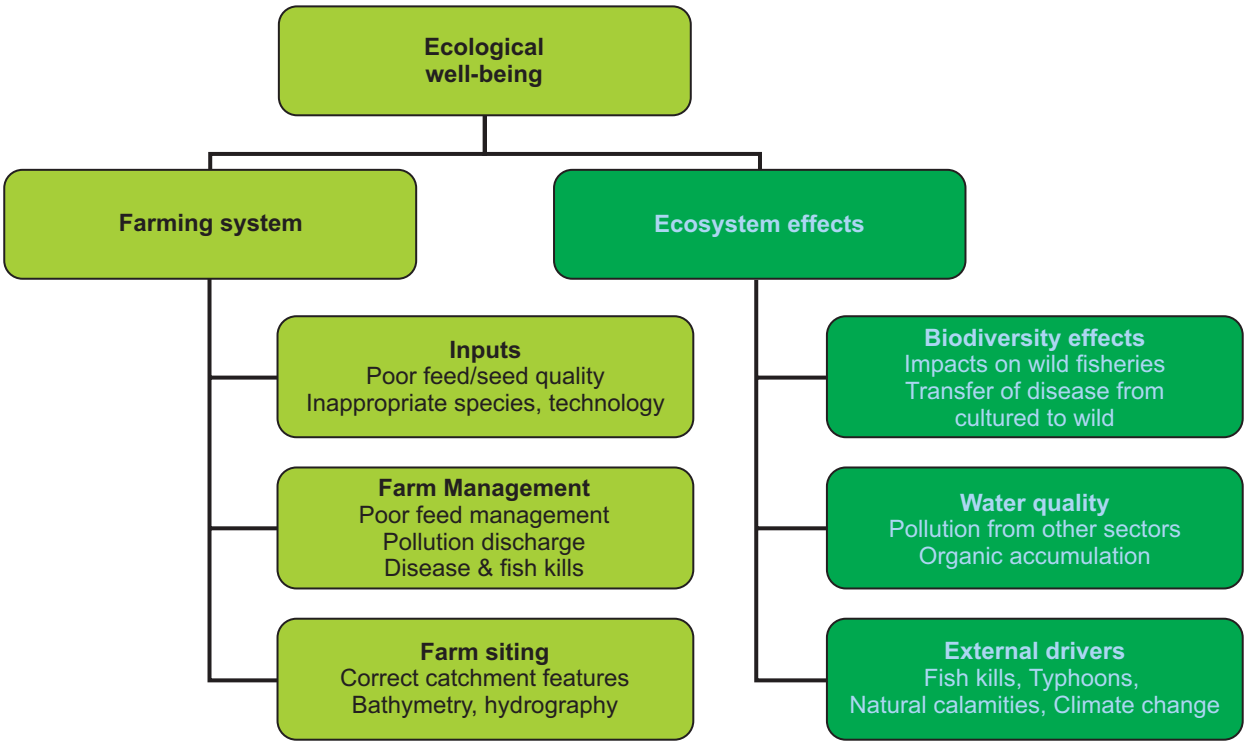


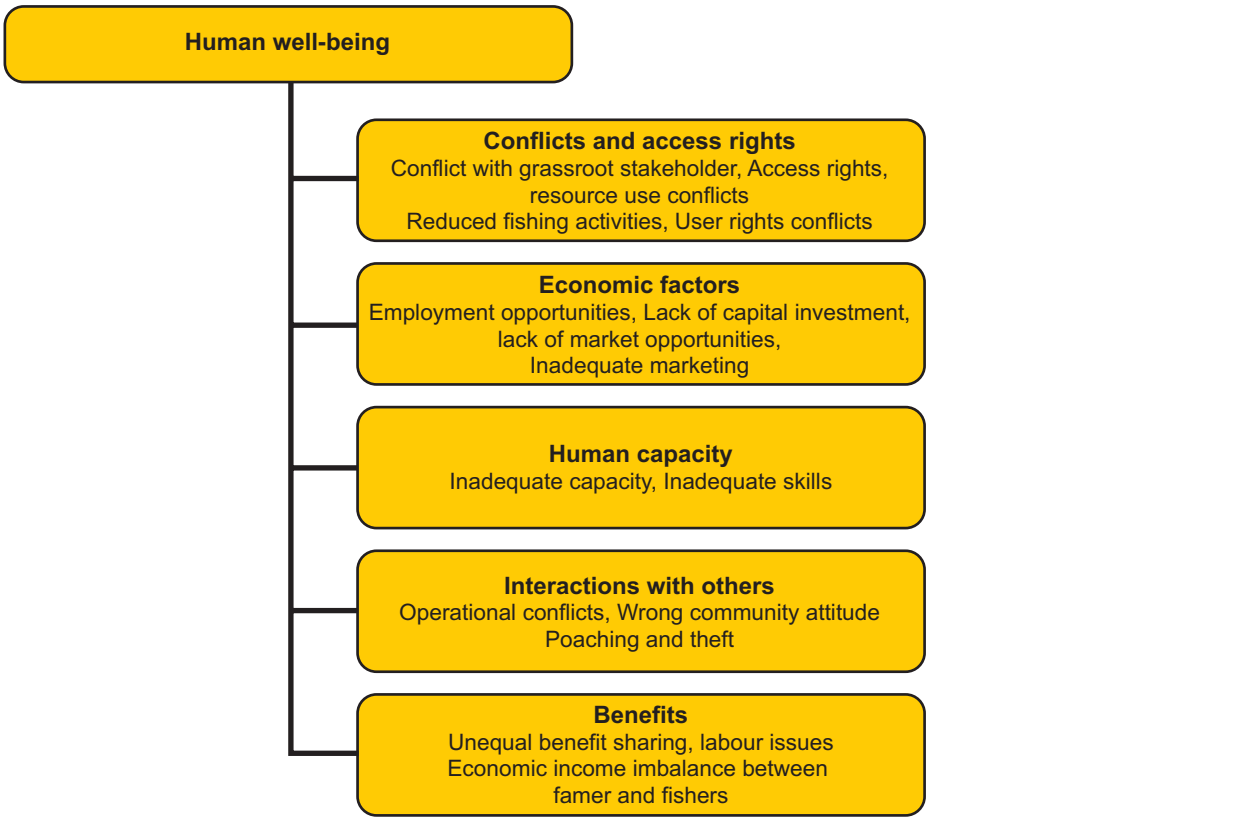


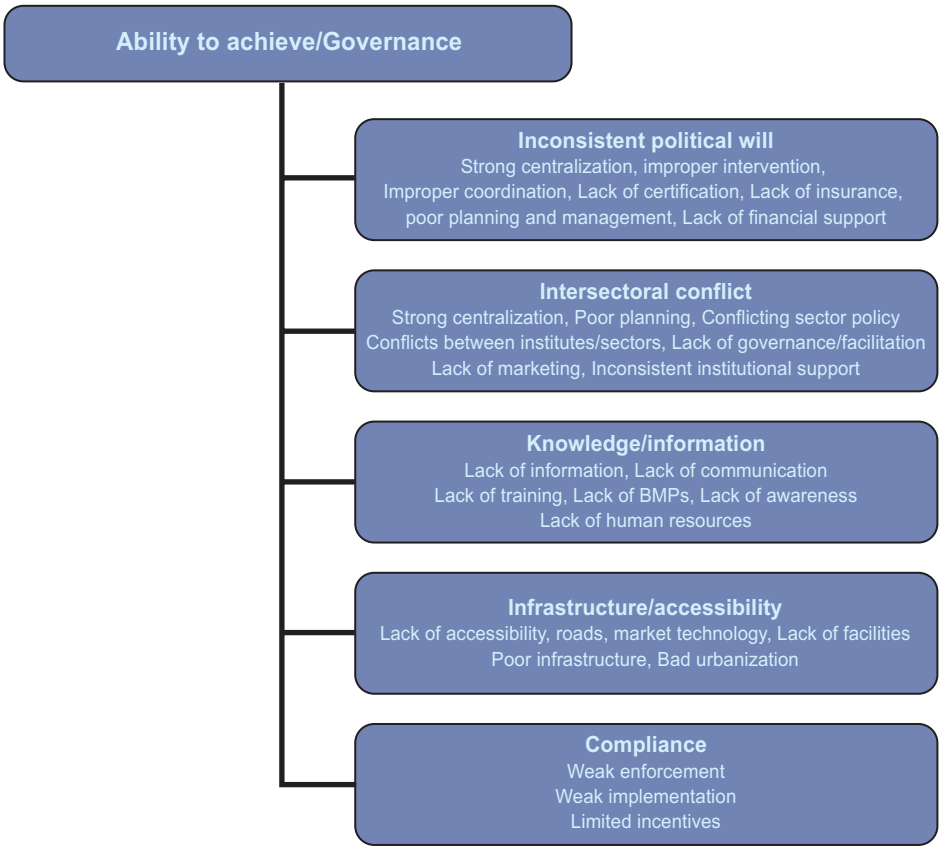

Ability to achieve/Governance
National Govt., Fisheries agency, Environmental agency
Policy and strategy in fisheries
Monitoring limitations, Insufficient financial allocation
Fishing communities Fishing industry
Traditional management systems, Use of illegal gears
Poor compliance, conflicts between large and small scale
Consultation/dialogue
Political interference, Process irregular, poorly institutionalized,
Fisheries poorly represented
Information/knowledge
Data deficiency, Lack of capacity
Using local/traditional knowledge, Linking research to management
Global economy
Variability of fuel price
Compliance
Weak enforcement, Weak implementation,
Limited incentives
Human well-being
Income & employment
Income for fisheries declining, Gender issues,
Loss of work opportunities, Food security
Safety and health
Security
Food poisoning (algal bloom)
Post-harvest
Poor post-harvest handling reduces value
Low prices for fish, Competition with aquaculture products
Interactions with other sectors
Tourism competition, Industries, Land tenure

GENERIC TREE – AQUACULTURE






Human well-being
Conflicts and access rights
Conflict with grassroot stakeholder, Access rights, resource use conflicts
Reduced fishing activities, User rights conflicts
Economic factors
Employment opportunities, Lack of capital investment, lack of market opportunities,
Inadequate marketing
Human capacity
Inadequate capacity, Inadequate skills
Interactions with others
Operational conflicts, Wrong community attitude
Poaching and theft
Benefits
Unequal benefit sharing, labour issues
Economic income imbalance between famer and fishers


Ability to achieve/Governance
Inconsistent political will
Strong centralization, improper intervention,
Improper coordination, Lack of certification, Lack of insurance,
poor planning and management, Lack of financial support
Intersectoral conflict
Strong centralization, Poor planning, Conflicting sector policy
Conflicts between institutes/sectors, Lack of governance/facilitation
Lack of marketing, Inconsistent institutional support
Knowledge/information
Lack of information, Lack of communication
Lack of training, Lack of BMPs, Lack of awareness
Lack of human resources
Infrastructure/accessibility
Lack of accessibility, roads, market technology, Lack of facilities
Poor infrastructure, Bad urbanization
Compliance
Weak enforcement
Weak implementation
Limited incentives

ANNEX IX – BOBP-IGO REVIEW OF EAF/EAA MEASURES

Implementation of the Ecosystem Approach to Fisheries and Aquaculture in the BOBP-IGO Region*

This presentation provides an overview of the present status of the Ecosystem Approach to Fisheries (EAF) in the four member-countries (Bangladesh, India, Maldives, Sri Lanka) of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO). The overview is based on the various dimensions of the EAF and their corresponding parameters. The country-wise status on each of the EAF parameters is based on their performance and rated as follows:

> ***Unsatisfactory*** = the country either lacks necessary legal framework or funding/manpower support in respect of the parameter concerned or both and the country cannot effectively deal with the parameter by 2012 – the original deadline for adapting EAF or within coming 5 years (The WSSD Plan of Implementation).
>
> ***Moderately satisfactory*** = the country has necessary legal framework and funding and manpower support. However, the implementation needs to be streamlined and the country may possibly deal with the parameter by 2012 or within the coming 5 years.
>
> ***Satisfactory*** = the country has effectively initiated the process for dealing with the parameter concerned and can satisfactorily conclude the process by 2012 or within the coming 5 years.

Accordingly, to arrive at an indicative score *t**o gauge the preparedness of the country to implement EAF***, we have taken the simple average of the probabilistic values of the criterion used. The values are subjective and based on the available documentation and also the experience of BOBP-IGO in the member-countries. The values are as follows:

> **Unsatisfactory (U) = 0**
> **Moderately Satisfactory (MS) = 0.50**
> **Satisfactory (S) = 0.99**

Where information was not available while preparing this presentation, 'N/A' has been used and the same has been assigned the value of '0'.

* Yugraj Singh Yadava & Rajdeep Mukherjee, Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), 91, St. Mary's Road, Abhirampuram, Chennai, Tamil Nadu, India.

List of dimension and corresponding parameters considered in the analysis

Fisheries management	Monitoring, control and surveillance	Legal and policy support	Conservation of fish stocks and pollution control/ mitigation	Research and development	Stakeholder participation, capacity building and other issues
• Stock assessment/ information on status of fish stocks • Fleet assessment • Fleet regulation • Gear regulation • Spatial and temporal closures • Reduction in by-catch • Reduction in juvenile catch • Reduction in fish discards, ghost fishing, etc. • Application of precautionary principle • Termination of bad subsidies	• Shore-based monitoring • At-sea monitoring • Observer programme • Controlling/ reducing IUU fishing	• Dedicated Law(s) for fisheries management • Commitment to international treaties and conventions • Formulation of marine fisheries policy • Coherence of marine fisheries policy with national development plans and policies • Incorporation of 'responsible/ sustainable fishing' in marine fisheries policy • Integrated Coastal Area Management Plans • Ensuring access and availability of institutional finance and asset insurance • Social security nets (*e.g.* insurance, pension)	• Species-specific management plans • Conservation of fully/over harvested fish stocks • Rebuilding of depleted fish stocks • Artificial measures to improve fish stocks • Setting up of Marine Protected Areas (MPAs) • Curbing discharge of land-based pollution to the sea • Controlling oil spills, discharge of ballast water, etc.	• Scientific data collection system • Data collation, analysis and reporting • Real time monitoring of fish stocks • Linking R&D to policy making • Linking R&D to real-time decision making • Linking R&D to public awareness	• Stakeholder consultation in policy formulation • Subsidiarity • Co-management • Capacity building of fisheries staff/other important stakeholders • Building of physical infrastructure • Eco-labeling and other quality assurance • Trade matters

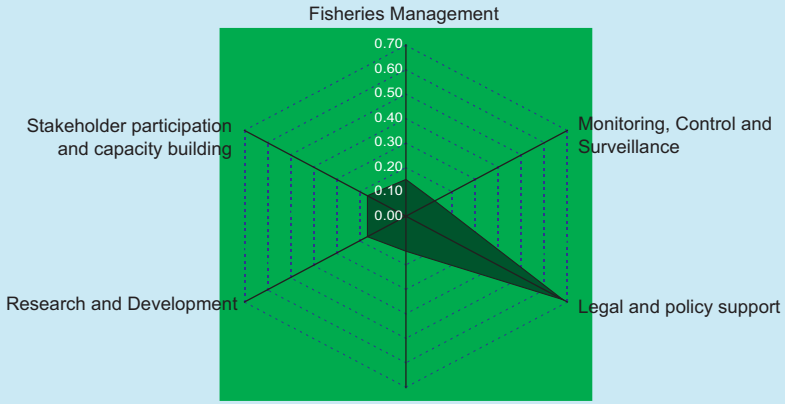
Summary of analysis

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Fisheries Management	Stock assessment/information on status of fish stocks	U	MS	U	U
	Fleet assessment	U	MS	S	S
	Fleet regulation	U	U	MS	MS
	Gear regulation	U	U	S	U
	Spatial and temporal closures	MS	MS	MS	N/A
	Reduction in by-catch	U	U	MS	MS
	Reduction in juvenile catch	MS	MS	N/A	N/A
	Reduction in fish discards, ghost fishing, etc.	MS	MS	S	MS
	Application of precautionary principle	U	U	U	U
	Termination of bad subsidies	U	U	U	U
Monitoring, Control and Surveillance	Shore-based monitoring	U	U	MS	MS
	At-sea monitoring	MS	MS	MS	U
	Observer programme	U	U	U	U
	Controlling/reducing IUU fishing	U	U	U	U
Legal and policy support	Dedicated Law(s) for fisheries management	S	S	S	S
	Commitment to international treaties and conventions	S	S	S	S
	Formulation of marine fisheries policy	S	S	S	S
	Coherence of marine fisheries policy with national development policies	S	S	S	S
	Incorporation of 'responsible/sustainable fishing' in marine fisheries policy	MS	MS	MS	MS
	Integrated Coastal Area Management Plans	S	S	S	S
	Ensuring access and availability of institutional finance and asset insurance	U	U	MS	U
	Social security net (*e.g.* insurance, pension)	U	MS	N/A	MS
Conservation of fish stocks and pollution control/ mitigation	Species specific management plans	MS	U	MS	U
	Conservation of fully/over harvested species	U	U	MS	U
	Rebuilding of depleted fish stocks	U	U	N/A	U
	Artificial measures to improve fish stocks	U	U	N/A	U
	Setting up of Marine Protected Areas	MS	MS	MS	MS
	Curbing discharge of land-based pollution to sea	U	U	U	U
	Controlling oil spills, discharge of ballast water, etc.	U	U	U	U
Research and Development	Scientific data collection system	U	MS	S	MS
	Data collation, analysis and reporting	MS	MS	S	MS
	Real time monitoring of fish stocks	U	U	MS	U
	Consultation between R&D and policy-making	MS	MS	MS	MS
	Use of R&D for real-time decision-making	U	U	U	U
	Linking R&D to public awareness	U	U	MS	U

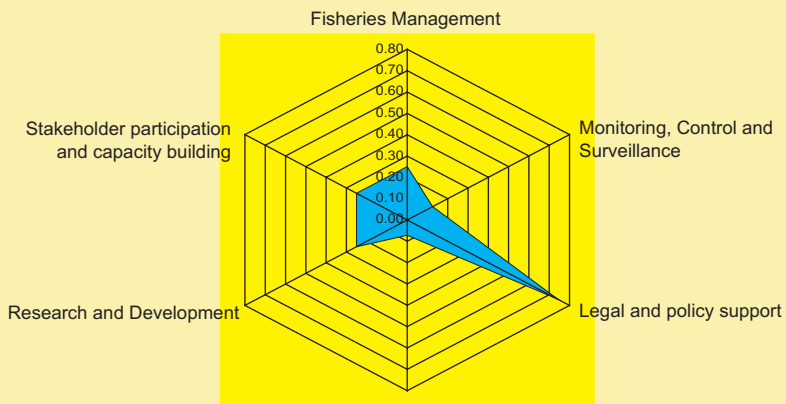
Stakeholder participation and capacity building	Stakeholder consultation in policy formulation	MS	MS	MS	MS
	Subsidiarity	U	U	U	U
	Co-management	U	U	U	U
	Training for fisheries staff and other important stakeholders	MS	MS	MS	MS
	Building of physical infrastructure	U	MS	MS	MS
	Eco-labeling, quality assurance and trade matters	U	U	U	U
Indicative score		**0.24**	**0.29**	**0.48**	**0.32**

Indicative scores of the member-countries under each dimension

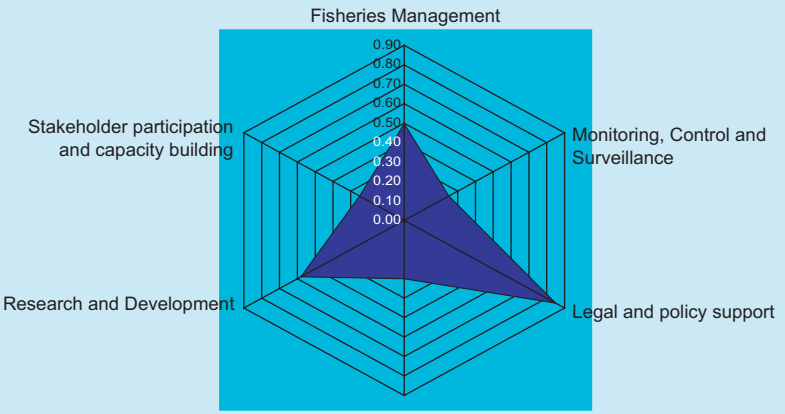
Bangladesh



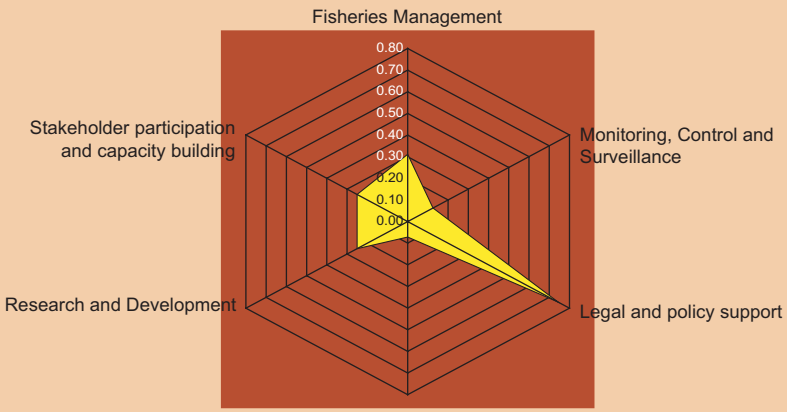
India



Maldives



Sri Lanka



Detailed Analysis

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Fisheries Management	**Stock assessment/ status of fish stocks**	***No regular stock assessment*** The last survey was conducted in 1979-1980. The country has an annual harvestable potential of 7–8 000 metric tonnes (mt) of shrimp and 40–55 000 mt of demersal fish. The stock assessment[1] of *Tenualosa ilisha* in Bangladesh waters is based on length based analysis using the data for the period 1997-1999. As per the study, the annual stock of *T. ilisha* is 341 181.57 tonnes and the MSY is 165 271.49 tonnes. However, the annual average exploitation is 209 833.00 tonnes.	***No regular stock assessment*** The Ministry of Agriculture conducted the last stock assessment in 2001 and estimated the potential yield as 3.92 million tonnes. This includes 1.93 million tonnes of demersal fish and 1.99 million tonnes of pelagic fish. The fish catch in 2006 was estimated as 2.96 million tonnes. However, the country has a dedicated organization (Fishery Survey of India) with adequate infrastructure to carry out fish stocks assessment. Sister organizations such as the Central Marine Fisheries Research Institute and the National Institute of Oceanography also collect parameters which are used for stock assessment.	***No regular stock assessment*** Total reported tuna catches at present are 170 000 mt of which 80 percent is skipjack tuna followed by yellowfin tuna. Stock assessments undertaken by the Indian Ocean Tuna Commission (IOTC) have found that the current Indian Ocean catches are more than the replacement yield of the stock. For skipjack tuna no assessment has been done. Following exploratory surveys in 1988/1989 and 1990/1991, Anderson *et al* (1992) calculated a MSY of 30 000 $\pm$ 13 000 tonnes/year for reef fishery[2].	***No regular stock assessment*** The MSY of the coastal marine resources was estimated during 1979-1980 at about 250 000 mt of which up to 170 000 mt are pelagic fish and up to 80 000 mt are demersal or semi-demersal fish stocks. Fisheries in offshore/ deep waters have not been systematically estimated but the government has estimated the offshore resource potential at about 150 000 mt[3].

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Fisheries Management (continued)	**Fleet assessment**	***No regular fleet assessment*** According to the Department of Fisheries (DOF) there are about 44 082 fishing vessels (Trawler = 122; Gill netter = 25 369; set bag net = 12 765; long liner = 2 641; others = 3 185) in Bangladesh. This has increased from 17 385 in 1997-1998. The size of mechanized/Estuarine Set-bag Net (ESBN) boats differs from 10–15 m in length, 3-4 m in breadth and 1.1–2.0 m in draft. The size of industrial trawlers varies from 20–45 m in length, 5.5–8.5 m in breadth and 2.7–4.4 m in draft.	***No regular fleet assessment*** The National Marine Fisheries Census was carried out in 2005 after a gap of 25 years. As per the Census the Indian marine fishing fleet comprises about 243 939 fishing vessels of which 107 448 (44.05%) are traditional and 76 748 (31.46%) motorized traditional crafts. The mechanized fishing vessels (MFVs) comprise 59 743 (24.49%) vessels. The fleet size varies considerably in artisanal and mechanized fishery.	***No regular fleet assessment*** Data on average number of fishing boats engaged per month shows that engagement has declined from 1 533 in 1990 to 973 in 2007. Mechanized Masdhonis constitutes 91 percent of the engaged vessels. The number of trips made by these fishing vessels has also come down from 189 941 for mechanized Masdhoni in 2005 to 172 025 trips in 2007.[4]	***No regular fleet assessment*** The total fishing fleet consists vessels of diverse types, broadly classifiable into: non-motorized traditional craft; motorized traditional craft; fibre glass hulled boats of 6–7 m LoA; larger boats of about 3.5 t; offshore multi-day boats; and beach seine craft. The number of fishing vessels also has increased from a total of 30 567 in 2004 to 29 312 in 2005 and to 35 350 in 2006.
	Fleet regulation	Registration with Marine Mercantile Department (MMD) is necessary. However, according to some estimates <20 percent boats are registered. Since the mid-eighties commercial shrimp and finfish trawler skippers need to regularly produce log books on the catches of shrimp and fish.	Fishing vessel registration is followed as per the provisions contained in the Marine Fishing Regulation Act (MFRA) of the coastal States/Union Territories (for vessel below 24 m LoA) and carried out by the DOF. For vessels larger than 24 m OAL, registration/licensing is carried out and as per the Merchant Shipping Act, 1958, by the MMD.	Ministry of Economic Development and Trade is responsible for the licensing of all commercial fishing vessels including foreign fishing vessels and also determines the numbers of licenses to be issued. The Ministry of Housing, Transport and Environment is responsible for registration of fishing vessels, regulatory safety checks and training of officers and crew.	The fishing vessels need to registered and licensed by the Department of Fisheries and Aquatic Resources.

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Fisheries Management *(continued)*	**Gear Regulation**	Cod-end mesh size of 45 mm mesh size is enforced for shrimp trawl nets to facilitate the escape of small sized fin and shell fishes. Since 2002-2003, a high profile drive against catching of *jatka* by small mesh nets called "*Current Jaal"* has been in force during February to May every year.	Measures vary from state to state on the basis of their own MFRAs. Example – in the West Coast state of Gujarat, the non-mechanized fishing vessels may be used for fishing within five nautical miles from the shore and shall go for hook and line fishing, gillnetting, etc. Bottom trawling shall not be conducted within five nautical miles (9.00 kms) from the coast line. In the Southern sate of Tamil Nadu, non-mechanized fishing vessels are permitted for fishing within three nautical miles from the shore and shall go for hook and line fishing and boat seine.	Fixed fish traps or weirs must be registered at the Atoll office. Prior permission from the Ministry of Fisheries and Agriculture (MoFA) is required before installing fish holding cages or pens. There is prohibition on removal of any drifting object from the fishing grounds and on use of any dynamite or explosives or poison to catch fish. There is also prohibition on fishing for lobster and *beche-de-mer* by diving with deep diving equipment.	Push net fishing, harpooning for marine mammals, moxi net fishing and gill net or trammels net fishing on coral reefs or rocks are prohibited.
	Spatial and temporal closures	Presently, seasonal closures are applied for specific fisheries (Hilsa) during spawning season.	Presently, a carpet ban is applied during monsoons. The ban varies across the states. On the east coast, fishing is generally closed during 15th April to 29/31st May each year. In the west coast states, fishing is generally banned from 10 June to 15 August.	Presently, closure is enforced for shark fisheries in the Atoll basins and also within 12 nautical miles of the outer rim of the Atolls.	N/A
	Reduction in by-catch	Mixed fishery with dominance of shrimp trawling is leading to by catch.	Mixed fishery with dominance of shrimp trawling leading to by catch.	Targeted pole and line tuna fishery. However, in reef fishery by-catch is common.	By-catch of shark is a major issue.

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Fisheries Management (continued)	**Reduction in juvenile catch**	The government since the year 2000 (and reinforced in 2002) has restricted collection of post larvae (PL) in coastal area in 2000. However, actual enforcement is a major issue.	There are legal provisions banning PL collections. However, actual enforcement is a major issue.	N/A	N/A
	Reduction in fish discards, ghost fishing, etc.	Stipulation for shrimp trawlers to have about 1/3 fin fishes in total landings. Ban applies to discarding any fish or aquatic resources into the sea except turtles. However, in 1997-1998 the rate of fish discards for industrial trawlers (fish & shrimp) was as high as 83 percent. For artisanal fisheries it was 1 percent in 1998-1999 (FAO Study).	No dedicated law for fish discards within territorial waters. As per FAO data, in 2001 the rate of fish discards was at 2 percent or about 58 000 tonnes.	Incidence of fish discards is probably low due to targeted fishing. As per FAO data in 2002 about 0.5 percent fish were discarded in the fishery.	Incidence of fish discards is probably low due to targeted fishing. As per FAO data in 2002 about 0.5 percent fish were discarded.
	Application of precautionary principle	Not practiced	Not practiced. Although many important judgements of the higher courts have laid emphasis on the use of 'Precautionary Principle'.	Not practiced	Not practiced
	Termination of bad subsidies	Needs political decision.	Needs political decision.	Needs political decision.	Needs political decision.

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Monitoring, Control and surveillance	**Shore-based monitoring**	Through check posts in a couple of places on the coastline. However, lack of manpower is a problem for achieving the objectives.	Large number of traditional landing centres and lack of manpower leading to poor monitoring.	Organized in Malé. However, monitoring in distant fishing Atolls is a major logistical issue.	Post-tsunami new initiatives have been undertaken. However, the civil strife is the north and north-eastern areas of the country has been a serious obstacle for effective monitoring.
	At-sea monitoring	Through the Coast Guard/Navy. However, lack of manpower has constrained the monitoring process.	Through the Coast Guard and at times supported by the Navy. However, the manpower is not commensurate with the size of the EEZ. In the post-Mumbai scenario, monitoring of the sector is receiving priority. The Government is also developing transponders ad satellite based system. Still, large number of artisanal boats may render inefficacy.	Through the Coast Guard. Vessel tracking system is in place for offshore fishery (foreign fishing vessels).	Through the Navy. Due to civil strife, engagement of Navy in monitoring is reduced.
	Observer programme	Not implemented	Not implemented	Not implemented	Not implemented
	Controlling IUU fishing	Through vigilance of Coast Guard/Navy. No effective mechanism.	Through vigilance of Coast Guard for foreign fishing fleet. No effective mechanism for domestic fleet engaged in IUU fishing, although the MFRAs are in place. A new law for operation of domestic vessels in the EEZ is under formulation.	Through vigilance of Coast Guard/Navy. No effective mechanism.	Through vigilance of Coast Guard/Navy. No effective mechanism.

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Legal and policy support	**Dedicated Laws for fisheries management**	• The Conservation and Protection of Fish Act – 1950, • The Marine Fisheries Ordinance – 1983. • The Bangladesh Fisheries Research Institute Ordinance. • The Fish Products Inspection and Quality Control Ordinance – 1983. • The Bangladesh Fisheries Development Corporation Act – 1973.	• Fishing within territorial waters is within the exclusive province of the State, beyond the territorial waters it is under the exclusive domain of the Union. • The Marine Fishing Regulation Act of the coastal states/UTs. • Maritime Zone of India (Regulation of Foreign Fishing Vessels) Act, 1981. • Indian Fisheries Act, 1897. • The Indian Coast Guard Act, 1978.	• The Fisheries Law of Maldives, 1987 • A fisheries master plan under preparation.	• The Fisheries and Aquatic Resources Act, No. 2 of 1996. • The Fisheries Master Plan (2006-2016)
	Commitment to international treaties and conventions	Party to important conventions and treaties like UNCLOS, CBD, CCRF, etc. The issues are with respect to the implementation of the provisions.	Party to important conventions and treaties like UNCLOS, CBD, CCRF, etc. The issues are with respect to the implementation of the provisions.	Party to important conventions and treaties like UNCLOS, CBD, CCRF, etc. The issues are with respect to the implementation of the provisions.	Party to important convention and treaties like UNCLOS, CBD, CCRF, etc. The issues are with respect to the implementation of the provisions.

Dimension	Parameters	Countries			
		Bangladesh	**India**	**Maldives**	**Sri Lanka**
Legal and policy support *(continued)*	**Formulation of National Marine Fisheries Policy**	National Fisheries Policy, 1998 Objectives: Enhancement of the fisheries production; Poverty alleviation through creating self-employment and improvement of socio-economic conditions of the fishers; Fulfill the demand for animal protein; Achieve economic growth through earning foreign currency by exporting fish and fisheries products; Maintain ecological balance, conserve biodiversity, ensure public health and provide recreational facilities	Comprehensive Marine Fishing Policy, 2004, The policy objectives are: (1) to augment marine fish production of the country up to the sustainable level in a responsible manner so as to boost export of sea food from the country and also to increase per capita fish protein intake of the masses, (2) to ensure socio-economic security of the artisanal fishermen whose livelihoods solely depends on this vocation. (3) to ensure sustainable development of marine fisheries with due concern for ecological integrity and biodiversity.	The National Development Plan, 2006-2010 of Maldives. ***Policy 1:*** Support diversification of fish harvesting and post-harvest industry; ***Policy 2:*** Encourage and continue investments in the skipjack industry; ***Policy 3:*** Support and facilitate the establishment and development of a mariculture industry; ***Policy 4:*** Continue restructuring of the sector; ***Policy 5:*** Increase human resource capacity; ***Policy 6:*** Ensure sustainable socio-economic development; ***Policy 7:*** Strengthen and expand research capacity; ***Policy 8:*** Ensure sustainable management of marine resources.	The National Fisheries and Aquatic Resources Policy, 2006 *Policy objectives are:* To improve nutritional status and food security of the people by increasing the national fish production; To minimize post-harvest losses and improve quality and safety of fish products to acceptable standards; To increase employment opportunities in fisheries and aquatic resources related industries, and improve the socio-economic status of the fisher community; To increase foreign exchange earnings from fish and aquatic product exports; and To conserve the aquatic environment.
	Coherence of national marine fisheries policy with national development policies	Growth oriented with focus on job creation	Growth oriented with focus on job creation	Growth oriented with focus on job creation	Growth oriented with focus on job creation

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Legal and policy support (continued)	**Incorporation of 'responsible/ sustainable fishing' in national marine fisheries policy**	Sustainability is one of the goals of fisheries policy	Sustainability is one of the goals of fisheries policy	Sustainability is one of the goals of fisheries policy	Sustainability is one of the goals of fisheries policy
	Integrated Coastal Area Management Plans	Coastal Zone Policy, 2005	The CRZ Notification was issued in the year 1991 using the provisions of the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986. The CRZ Notification was issued under Section 3(1) and Section 3(2)(v) of the Environment (Protection) Act, 1986 and was introduced with the intention of protecting the coastal environment of India[5]. The Notification is undergoing major revisions	Responsibility of managing coastal zones is shared by various Ministries including MoFA, Ministry of Planning, etc. Post-tsunami, effort is going on to build a comprehensive framework for ICZM.	National Coastal Zone Management Plan adopted in 1990.
	Ensuring access and availability of institutional finance and insurance	Weak. Even microfinance is not reaching to artisanal fishers. Lack of insurance provisions for small-scale and artisanal fishers.	Weak. Even microfinance is not reaching to artisanal fishers. Lack of insurance for fishers' assets.	N/A	Weak. Lack of enough institutional finance and insurance for fishers and their assets.

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Conservation of fish stocks and pollution control/mitigation	**Species specific management plan**	Four sites in the coastal area have been established as hilsa sanctuaries, where fishing is banned from 15–24 October every year during peak hilsa spawning period.	So far no species/stock is covered under management plan.	Specific plan for sharks is under progress.	So far no management plan is in place, although some species/ stocks are under consideration for management plans.
	Conservation of fully/over harvested species	Conservation plan for hilsa is in place.	Conservation plans for marine turtles are in place. Some size-based conservation measures are also in place.	The Ministry of Fisheries and Agriculture (MoFA) has declared a ban, effective from 1st of March 2009, on any fishery targeted at killing, capturing or extraction of any shark species inside and within 12 miles from the outer Atoll rim of all Maldivian Atolls.	Protected Marine Life: Dolphin, Turtle, Whale, Whales Shark, Napoleon Wrasse, Giant Clam, Triton Shell, Black Coral, Lobsters less than 25 cm in length or berried female lobster.
	Rebuilding of depleted fish stocks	No additional effort outside conservation	No additional effort outside conservation	No additional effort outside conservation	No additional effort outside conservation
	Artificial measures to improve fish stocks	N/A	Installation of artificial reefs in some areas.	N/A	N/A

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Conservation of fish stocks and pollution control/mitigation (continued)	**Setting up of MPAs[6]**	*7 nationally designated protected areas.* Char Kukri-Mukri Wildlife Sanctuary; Himchari National Park, Jinjiradwip; Jinjira Reefs; Sundarbans East Wildlife Sanctuary; Sundarbans South Wildlife Sanctuary; Sundarbans West Wildlife Sanctuary; Teknaf.	*120 nationally designated protected areas.*	*25 nationally designated protected areas.*	14 nationally designated protected areas. Annaiwilundhawa Sanctuary; Bar Reef Marine Sanctuary Big Sorber Island Sanctuary; Bundala National Park Chundikullam Sanctuary; Hikkaduwa Marine Sanctuary; Kalametiya Lagoon Sanctuary; Kokilay Sanctuary Kudumbi-Gala Sanctuary; Kumana (Yala East) Seruwavila Sanctuary; Wilpattu Block 1 National Park; Yala Strict Nature Reserve; Yala (Ruhuna) National Park.
	Curbing discharge of polluted water/ untreated water at sea	No effective mechanism. Sources are agriculture, sewage, industrial waste.	No effective mechanism. Sources are agriculture, sewage, industrial waste.	No effective mechanism. Main source is urban sewage.	No effective mechanism. Main sources agriculture, sewage and industrial waste.
	Controlling oil spills, discharge of ballast water, etc.	Through vigilance of Coast Guard/Navy. No effective mechanism. Poor technical capability to deal with oil spill.	Through vigilance of Coast Guard/Navy. No effective mechanism. Poor technical capability to deal with oil spill.	Through vigilance of Coast Guard/Navy. No effective mechanism. Poor technical capability to deal with oil spill.	Through vigilance of Coast Guard/Navy. No effective mechanism. Poor technical capability to deal with oil spill.

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Monitoring, Research and Development	**Scientific data collection system**	Through on-site surveys and sampling. No regular sampling mechanism for data collection.	Through on-site surveys and sampling. Discrepancy in reporting by the coastal states and the Central Marine Fisheries Research Institute (CMFRI).	Through mandatory reporting by fishing vessels. No regular cross-checking mechanism for the information provided by the fishers.	Through on-site surveys and sampling. No regular sampling mechanism for data collection.
	Data collation, analysis and reporting	The Bangladesh Fisheries Research Institute (BFRI) is the leading institute. However, funding and real time reporting of research findings is a problem.	A network of research institutes is present. The organizations under the Indian Council of Agricultural Research are the leading agencies (*e.g.* CMFRI). The Fishery Survey of India under the Ministry of Agriculture is also engaged in data collection. However, real time reporting of research findings is a major issue.	The Marine Research Centre is the leading institute. However, funding and real time reporting of research findings is a problem.	The National Aquaculture Research and Management Agency (NARA) is the leading institute. However, funding and real time reporting of research findings is a problem.
	Real time monitoring of fish stocks	Absent	Absent	Absent	Absent
	Linking R&D to policy-making	Weak or no linkage	Weak or no linkage	Weak or no linkage	Weak or no linkage
	Linking R&D to real-time decision-making	Weak or no linkage	Weak or no linkage	Weak or no linkage	Weak or no linkage
	Linking R&D to public awareness	Weak or no linkage	Weak or no linkage	Weak or no linkage	Weak or no linkage

Dimension	Parameters	Countries			
		Bangladesh	India	Maldives	Sri Lanka
Stakeholder participation and capacity building	**Stakeholder consultation in policy formulation**	Weak or no linkage.	Weak or no linkage	Initiated	Initiated
	Subsidiarity	Weak	Weak	Weak	Weak
	Co-management	Weak	Preliminary stages, mostly in lake fisheries.	N/A	Under Fisheries and Aquatic Resources Act, No. 2 of 1996, about 700 management areas have so far been declared for management of fisheries resources through community participation.
	Training for fisheries staffs	No routine training programme for skill up gradation.	No routine training programme for skill up gradation.	No routine training programme for skill up gradation.	No routine training programme for skill up gradation.
	Building of physical infrastructure	Weak	Satisfactory	Satisfactory	Satisfactory
	Eco-labeling, quality assurance and trade matters	Weak	Weak	Weak	Weak

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[3] http://www.apfic.org/modules/xfsection/download.php?fileid=296.

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[6] Information collected from The World Database on Protected Areas (http://www.wdpa.org/Default.aspx).

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