

# EAFToolbox

The ecosystem approach to fisheries







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## Preparation of the document

The basic principles for developing the toolbox were first identified and discussed at the Workshop on a Toolbox for the Ecosystem Approach to Fisheries (EAF), held in Rome, Italy, 26-29 February 2008 (FAO 2009). In developing the toolbox, attention has been placed on assisting users to understand and move through each of the steps for implementing EAF, and assist them to choose tools appropriate for their situation.

The EAF Toolbox is aimed at national and local fisheries management authorities, including fishery managers, scientists and stakeholders looking for practical solutions they can apply given their circumstances and resources. By ensuring situations with low capacity are covered adequately, it is hoped that the toolbox will be seen as useful by all individuals, groups and sectors interested in the development of improved fisheries management systems to better generate positive community outcomes in each location.

This document represents a subset of the web-based version [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net), the development of which has been completed with the input of a number of people. The main drafting team for the web pages and tool fact sheets included Rick Fletcher (Department of Fisheries Western Australia, Fisheries Research and Development Corporation and Visiting Scientist FAO), Gabriella Bianchi (FAO), Robin Mahon and Patrick McConney (CERMES, Barbados), Silje Rem (Ministry of Fisheries, Norway) and Serge Garcia. Final editing and revision of this document were undertaken by Marcelo Vasconcellos and Claire Attwood.



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# What is EAF?

**The Ecosystem Approach to Fisheries (EAF) is a practical way to implement sustainable development principles.**

The Ecosystem Approach to Fisheries (EAF) has been adopted by the FAO Committee on Fisheries (COFI) as the appropriate and practical way to fully implement the Code of Conduct for Responsible Fisheries.

EAF is a risk based management planning process that covers the principles of sustainable development including the human and social elements of sustainability, not just the ecological and environmental components.

**EAF also covers the human or social elements of sustainability.**

There are many different definitions of ecosystem based approaches (e.g. FAO, 2003)<sup>1</sup>. All include the need to maintain the ecosystem resources for their sustainable use, while recognising that humans are an integral part of the process. So, while the term EAF can be misinterpreted because this name doesn't include the non-ecological components of sustainability, EAF not only deals with all the ecological consequences of fishing, but it also explicitly deals with the social and economic implications (good and bad) generated by the management and institutional arrangements related to fisheries.

**EAF includes conventional fisheries management and doesn't need complete knowledge about the ecosystem.**

EAF seeks to improve all fishery management processes by adopting risk management principles that recognize complete knowledge is never available and is not essential to start the process. EAF works by the identification and assessment of all relevant issues and the establishment of participatory processes to help address high priorities effectively and efficiently. It assists with making the best decisions with the information available by using a precautionary (to reflect the risk) and an adaptive approach (to improve knowledge and adjust decisions). Implementing EAF helps to develop comprehensive fishery management systems that seek the sustainable and equitable use of the whole system (ecological and human) to best meet the community's needs and values.



<sup>1</sup> FAO. 2003. *The Ecosystem Approach to Fisheries*. FAO Technical Guidelines for Responsible Fisheries No. 4, Suppl. 2. Rome, FAO. 112 pp. (Available at [www.fao.org/docrep/005/y4470e00.htm](http://www.fao.org/docrep/005/y4470e00.htm)).

# Critical elements of EAF

**EAF deals with all the impacts of a fishing sector in relation to its contribution to meeting regional societal values and objectives.**

Implementing EAF essentially involves asking some key questions:

- What impacts are the fishing activities having on target and associated species and the broader ecosystem?
- What are the economic/social benefits and costs of fishing and related activities to the sector and society as a whole?
- What management arrangements and measures could be implemented to optimally address the issues affecting the sustainability of a fishery?
- What other activities and drivers beyond the control of fishery management are affecting the fishery's capacity to reach its management objectives?

The answers to these questions can vary greatly depending upon local societal values, livelihoods and ecosystem types.

What may be acceptable in one region may not be in another, because not all communities want the same outcomes from their fisheries.

All management decisions are risk based, even if this is not explicit. The EAF process helps to determine what (if any) management actions are appropriate for each issue given the current level of risk, available knowledge (including stakeholder input) and available resources.

EAF promotes the development of governance systems that match the complexity of the fishery and are aligned with the management agencies' responsibility and capacity to control.

EAF must be seen as an extension of conventional fisheries management, not as a parallel process. It is really just a different way of implementing management that involves a broader set of objectives and a more participative and adaptive process.

# The main EAF management planning steps

The EAF identifies and deals with all the positive and negative aspects associated with a fishery. This includes issues with little formal information and even issues generated from non-fishery sources (e.g. pollution, climate). The purpose of the EAF process is to develop and implement an integrated set of management arrangements for a fishery to generate more acceptable, sustainable and beneficial community outcomes.

The EAF planning steps have been specifically developed to apply to the management of fisheries. Interactions between EAF and cross-sectoral, environmental planning (e.g. within Large Marine Ecosystems and Integrated Coastal Zone Management frameworks), are not specifically dealt with here, but the four main steps and even many of the tools will still be relevant to these broader planning processes.

The four main steps in the EAF planning process for fisheries are outlined below.

## Step 1 Initiation and scope

Based on government and stakeholder input, generate an agreed and clear definition of the fishery (scale and type) plus a shared understanding of the social, economic and ecological objectives to be achieved.

## Step 2 Identification of assets, issues and priorities

Identify all relevant resource “assets”, community outcomes and the issues affecting their management (generated either by the fishery or external factors) and determine priorities for direct action to best achieve objectives.

## Step 3 Development of management system

Develop a management system to cost-effectively and holistically deal with all high priority issues that includes clear operational objectives and the ability to monitor and assess performance.

## Step 4 Implementation, monitoring and performance review

Document the actions required to implement the management system, monitor their completion and evaluate and report on their performance in delivering acceptable community outcomes.



# Procedure, pathway and timeline for EAF planning

While the four main steps of EAF can appear to be a linear sequence, starting at step 1 and moving sequentially to the end of step 4, the starting point for a fishery will depend on what triggered the planning process and what has already been achieved. Furthermore, because this is an iterative process, some steps and activities may need to be re-visited as new information or problems arise.

EAF management planning is best done as a participatory process. Therefore, sufficient time will be needed to obtain the political and financial support of policy-makers/government and the cooperation and acceptance of stakeholders to ensure the legitimacy of any plan that is developed.

It is technically possible for a small group to complete most of the EAF steps and activities within a very short time (e.g. one to two weeks). Such a short process is, however, unlikely to have included adequate consultation with stakeholders, or thoroughly reviewed the potential implications of all proposed management actions to guarantee acceptance. Conversely, a process that takes many years to complete will almost certainly lose commitment and support.

The EAF plan does not have to be (nor will it ever be) perfect at the beginning. Because it is an adaptive process, the plan can include the actions needed to generate any essential improvements that have been identified during the planning stages. Therefore, for the initial EAF planning process, a balance should be made between generating a plan that is 80 percent “correct” in a short time compared with taking a substantially longer time to get it 95 percent “correct”, by which time it may be too late, especially where there are urgent issues to address.

In such situations do not wait until you have completed the entire planning process, appropriate remedial actions should begin immediately.

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**EAF is not a rigid recipe and it should not take years to generate the first “operational” EAF based plan.**

# About the EAF Toolbox

The basic principles for developing the toolbox were first identified and discussed at the Workshop on a Toolbox for the Ecosystem Approach to Fisheries (EAF), held in Rome, Italy, from 26 to 29 February 2008 (FAO, 2009)<sup>2</sup>. The EAF Toolbox is aimed at national and local fisheries management authorities, including fishery managers, scientists and stakeholders looking for practical solutions they can apply given their circumstances and resources. By ensuring situations with low capacity are covered adequately, it is hoped that the toolbox will be seen as useful by all individuals, groups and sectors interested in the development of improved fisheries management systems to better generate positive community outcomes in each location.

The principles used to develop the toolbox are that it has to:

- **Be adaptable** and open to innovations and improvements being quickly incorporated.
- **Help users understand** and move through each of the steps for implementing EAF and allow users with **limited formal knowledge** to participate.
- Assist them to **choose** tools **appropriate for their situation** by summarising how each tool works and providing **criteria** such as cost, technical difficulty, level of participation and data requirements to assist selection.
- Provide access to guiding information especially reports, case studies, guidelines, manuals, etc. especially those accessible via **web links**. Use of academic references in the text is limited but each of the tool fact sheets has a list of useful **additional readings**.

The fact sheets presented in the EAF Toolbox are either stand-alone tools or summaries/portals to where more information is available for a major subject (e.g. stock assessment methods) each of which could probably benefit from having their own toolbox. The goal of the EAF Toolbox is to document some of the key tools that have been applied to different aspects of fisheries assessment and management. In the present printed version only selected examples of the tools are provided. The complete set of tools fact sheets, as well as suggested tools playlists by fishery types, are provided in the online version of the EAF Toolbox ([www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)).

The EAF Toolbox has been designed to guide users through each of the four main EAF management planning steps and activities using simplified text and clear instructions.

The toolbox also helps users decide which tool(s) could be most appropriate for each step given the type of fishery, their resources and capacity.

EAF management planning and implementation involves completing a series of steps and activities that are consistent with the application of any risk management system. In this core section of the EAF Toolbox, each of the EAF steps and their associated key activities are outlined with increasing levels of detail.

To assist with tool selection, the specific characteristics of each of the tools identified as relevant to completing one or more EAF activities are summarised. There is a dedicated section on consultation tools because these are relevant across most of the EAF steps.

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<sup>2</sup> FAO. 2009. *Report of the Workshop on Toolbox for Applying the Ecosystem Approach to Fisheries*. Rome, 26–29 February 2008. FAO Fisheries and Aquaculture Report No. 884. Rome, FAO. 52 pp. (Available at [www.fao.org/docrep/012/i0946e/i0946e00.htm](http://www.fao.org/docrep/012/i0946e/i0946e00.htm)).



# Tool selection criteria

Implementing EAF **is possible** for all types of fisheries, including subsistence and artisanal fisheries that usually have minimal data and formal management resources, and large multinational industrial fisheries with significant data sets and resources. Suitable options have been identified to complete each EAF step to cover the range of resources and capacities that may be available.

It is always important to select the tools most effective for a situation, but for fisheries with few resources or technical capacity this is especially critical. Even when resources are not limiting, the most expensive or complex tool may not always be the best one. The tool fact sheets include user tips that explain when a tool may or may not be so good to use.

To assist with tool selection, a set of criteria have been developed to help potential users choose between the various possibilities. It is recognized that in addition to these criteria, a number of other technical and social factors can influence which tool may be most appropriate so the criteria presented are not meant to be prescriptive.

## Criteria for tool selection

### Overall difficulty of use:

How easy or difficult is the tool to use?

### Cost:

How expensive in terms of dollars, people and time is the tool to use?

### Capacity needed:

How complex is the tool and what formal technical capacity/training is needed to use it?

### Formal knowledge/data required:

What level of formal background knowledge, datasets or preparatory work must be available and completed to use the tool effectively?

### Participation:

What level of community participation is possible/required or encouraged when applying the tool?

### Timeframe:

How long would it take to apply the tool in a specific situation?



# Step 1 Initiation and scope

## Step overview

The first step in undertaking comprehensive planning processes such as for EAF, should begin with the formation of an EAF project team and the development of a “roadmap”. This should outline the key drivers (internal and external) for undertaking the process, the expectations and motivations of the proponents, document the relevant stakeholders, likely impediments, the human and financial resources available and the specific set of methods to be used. This can be a very brief document (e.g. for a small community-based fishery) or a very detailed and comprehensive project plan and analysis (e.g. for a major fishery sector) which can be used to obtain formal endorsement, political backup and operational support from the relevant stakeholders and decision-making authority (central or local) to proceed.

EAF planning should not proceed until there is sufficient support and the scope of the exercise is at a practical level. A perceived lack of information should not, however, be used as an excuse to delay initiation because EAF deals with such situations.

With agreement to proceed, it is essential to formally define the scope and scale of the fishing activities, communities and geographic areas that will (or will not) be covered by the planning process. This may require clarifying any uncertainties about which agencies have management responsibility for the area and/or ecological resources under consideration.

This scoping should also identify the relevant societal/community values and high level objectives (e.g. fisheries, environment, economic, etc.) to be achieved and their hierarchy. These underpin the operational objectives targeted by management and affect which management options will generate better stakeholder compliance. All of these decisions plus summaries of any relevant background material should be documented in a scoping (EAF Baseline) report.

### Key activities

- 1.1 Initial process planning and stakeholder support.
- 1.2 Defining the fishery, societal values and high level objectives.
- 1.3 Finalise the scoping and background document.



### Main outputs

- I. Formation of an EAF project team and identifying the team leader.
- II. A roadmap that includes the specific methods and EAF tools to be used during the planning process, that identifies stakeholders, participants, resources, timing, timelines, etc.
- III. A decision to proceed or not with EAF management planning at this time.
- IV. If proceeding, a scoping or baseline document that clarifies what fishing activities are to be managed, the community objectives to be achieved, social values to be observed plus a summary of information about the fishery and its associated resources useful for the rest of the EAF process.



# Activity 1.1 Initial process planning and stakeholder support

## Overview of the activity

Where there is sufficient interest to implement EAF for a specific fishery the first action is to develop an EAF planning team and choose a team (project) leader who will also be the “champion” for the process. Given the number of activities involved in EAF management planning it is beneficial to develop a suitably detailed project plan or roadmap that documents the proposed set of tools and timetable to be used. This can be supported by initiating development of an EAF Baseline Report that documents what is known about the fishery, including what management and stakeholders want to achieve. A stakeholder analysis may be required if these groups are not already well known.

To determine what tools and participation levels are most appropriate, the available human resources, skills in facilitation, project management, stock assessment, etc. plus any financial constraints should be identified. While higher levels of stakeholder and expert participation can increase ownership of the outcome, they also increase the logistics, expense and duration. A balance between political and stakeholder expectations, resources, complexity and urgency is usually required.

A roadmap can be generated using the relevant questions (outlined below) in combination with the rest of the EAF Toolbox to determine what tools/participants/scheduling will be used. These can be documented using the EAF roadmap template or by using project planning software.

Formal approval for the roadmap may be needed from the relevant management agency (or broader government) to ensure the necessary resources will be made available and the resultant EAF plan will be implemented. The approvals process may sometimes require the use of Cost-Benefit or SWOT (Strengths, Weaknesses, Opportunities, Threats) analyses if high levels of time and resources are being requested.

If approval is obtained, a communication strategy to inform all stakeholders about the EAF process and their role should be developed and implemented. If approval is not obtained, this decision should be communicated to stakeholders and the EAF process delayed until any missing critical elements become available (e.g. financial, political, stakeholder commitment) or the scope of proposed planning methods are revised to better meet available resourcing levels/expectations.

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Photo: D. Minkoh/FAO



## Activity 1.1 Initial process planning and stakeholder support

### Relevant questions

#### Roadmap development

- Who should be in the EAF planning team? Who should be the project leader?
- How complex is the fishery? This defines how complex the management system should be – but this must reflect the available management capacity.
- What stakeholder interactions have already occurred? The less well known the stakeholder groups and their connections, the more thorough the preliminary analysis.
- What time is available to get stakeholder input? Shorter time frames limit the types of stakeholder engagement that can be used, but too long a process may result in a loss of stakeholder commitment.
- Are there conflicts or potential conflicts between and within the different stakeholder groups including resources, power distribution, objectives and expectations? This can affect the consultation methods that may be best to use, and those to avoid.
- What planning resources are available? Limited resources imply that less can be spent on each of the steps, calling for less expensive methods, fewer meetings or the need to raise additional funds.
- What capacity, competencies and knowledge are available? This affects the types and complexity of the assessments that can be conducted and what preliminary engagement will be needed.
- What institutional capacity is available? This also affects what types of management measures could be used or if capacity-building is required where more complex management systems are anticipated for the future.

#### Roadmap review

- Are there any major risks or potential blockages to the EAF planning process?
- Do you have all the resources and cooperation and endorsement you need at appropriate levels to undertake the activities outlined in the roadmap?
- Do you have an oversight mechanism in place?
- Overall, is it currently worth proceeding with the EAF planning process?
- If it was delayed, what would be the likely reaction of stakeholder groups?

## Activity 1.1 Initial process planning and stakeholder support

### Key actions

- Estimate if there is sufficient political, agency and stakeholder commitment to consider undertaking the EAF planning process.
- Form an EAF planning team, draft the initial terms of reference and identify the team leader (project champion).
- Draft a brief description of the fishery, its resources, and the relevant ecosystem.
- Identify the main reasons for, and potential benefits of, adopting an EAF Management Plan for this fishery.
- Undertake introductory consultation (e.g. with key stakeholders) to estimate requirements for effective stakeholder participation, the level of transparency needed and how future facilitation will best occur.
- Map the available financial and human resources, time, budget, capabilities, key participants/partners/decision makers, key intervening institutions.
- Given the available resources select which methods and tools are likely to be most appropriate for each of the steps in the EAF planning process and draft an initial roadmap of the different steps, including timing, places, participants, expected difficulties and outcomes, necessary human and financial resources, etc.
- Look for major risks and blockages and identify potential contingencies to ensure it meets the available resources and any other constraints (e.g. government commitment, election timelines, etc.).
- Present the draft roadmap to the relevant authority(ies) and seek formal endorsement and commitments for continuation and obtain any other guarantees necessary for support/resources/participation.
- Finalise the roadmap (e.g. adjusting budgets, methods if necessary).
- If there is agreement to continue, communicate the final roadmap outcome to stakeholders and likely participants.

## Activity 1.1 Initial process planning and stakeholder support

### Tools

An early brainstorming or SWOT session with the EAF planning team can identify concerns and issues among team members. This session could also determine what additional project management (or other) training is needed by team members before the project formally begins. Having some level of knowledge or experience in project management or planning within the EAF planning team, especially the team (project) leader, will be an asset for the entire process. Information on project planning can be found in dedicated project management manuals, online guides or by attending formal courses.

A roadmap template, which is a simple set of headings generated from the outputs of previous EAF case studies, can be used to help draft the roadmap document. Where more formal project plans are needed, the planning guides as outlined above can assist. For highly complex fisheries it may be beneficial to use project management software to generate the roadmap plan and monitor its progress, but these can be complicated to use.

The primary tool for generating the roadmap could be the EAF Toolbox, because this helps to select the “personalised” set of tools and actions that could be used to complete the EAF process. There are also a number of comprehensive EAF based guidelines that have been generated to assist with the entire EAF process, some of which are targeted at certain types of fisheries (e.g. Tuna, Africa). Finally there are many books and reviews that provide further background on the EAF principles and concepts that can be used to improve overall understanding of EAF.

The EAF Baseline Report template can be used to compile background information on the fishery. If a fishery already has a formal management plan, a status report or even a stock assessment report, these should contain most of the information needed. Only generate a new document where none is currently available.


In terms of raising stakeholder awareness there is a large amount of EAF background material that can be used to get the initial buy-in by stakeholder groups and local communities. These materials include PowerPoint presentations, guides, books, etc. that have been written for a number of different audiences. These can be used in combination with dissemination tools that get the information out to the community.

There are many tools available to assist in getting appropriate stakeholder engagement and understand the likely issues that will be involved in maintaining this engagement. Stakeholder analyses will be useful to ensure proper representation and smooth running of the process.

There are also tools to formally review the EAF roadmap plan where this is necessary. These include institutional analysis that examines how ready an agency or group is to undertake a project, SWOT and Cost Benefit analysis techniques to assess the overall proposal. Finally, when the decision has been made to proceed, there are a number of communication templates that are available to help get this information out to stakeholders.

The selection criteria for these tools are given in the following table.

# Activity 1.1 Initial process planning and stakeholder support

 Tools and information sources	Page	Selection criteria					
		Difficulty	Cost	Capacity	Know.	Participation	Time
Consultation tools	50						
Description for completing an EAF Baseline Report	63	Easy	L	L	L	M	S-L
EAF roadmap template	66	Easy	L	L	L	L-M	S
Stakeholder analysis	69	Moderate	L-M	M	L	M-H	S-M
Institutional analysis	73	Moderate	M	M	M	L-M	S
SWOT analysis	76	Moderate	L	L-M	L	M-H	S
Cost-benefit analysis	80	Fairly Hard	M	M	M	L	M
Comprehensive EAF management guides	*	Easy	L	M	L	H	L-M
Project planning steps	*	Moderate	M	M	M	L	M
Project planning and management software	*	Fairly Hard	H	M-H	M	L	M
Brainstorming	*	Easy	L-M	L-M	L	M-H	S
Communication templates and tools	*	Easy	L	L	L	H	S

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)  
 L = Low or Long    H = High    M = Medium    S = Short



## Activity 1.2 Defining the fishery, societal values and high level objectives

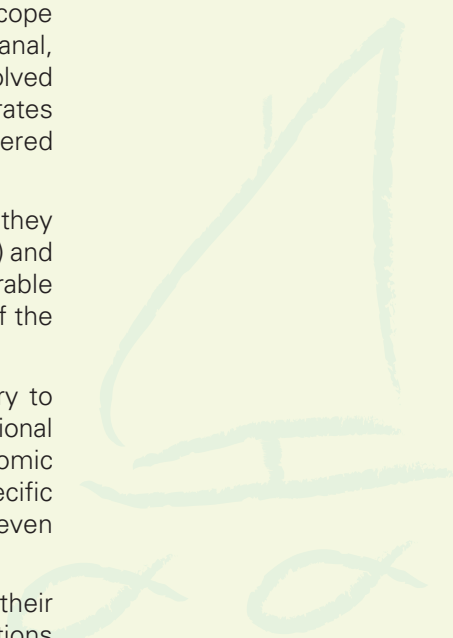
### Overview of the activity

To complete EAF planning you need to have a clear and agreed definition of the fishery. The scope of a fishery will usually be defined by some combination of the type of enterprise (e.g. artisanal, industrial); gear used (e.g. beach seine, trawl); target species (e.g. tuna, shrimp), the people involved and purpose of catch (e.g. subsistence, commercial), and the geographical area where it operates (e.g. a single bay, high seas). This removes all uncertainty about what will and what won't be covered by the plan.

If a management plan already exists, most of the characteristics will be documented, but they should be reviewed and circulated to stakeholders. If not, the relevant questions (outlined below) and checklists can be used, preferably in a scoping meeting, to generate an agreed scope. It is preferable if the activities and areas to be managed are all directly covered by the legislative jurisdiction of the management agency(ies).

EAF planning also requires agreement on what management objectives you want the fishery to achieve. These should directly reflect relevant community and national values, signed international conventions and can include: food and livelihood security; resource sustainability; economic performance; social amenity; cultural values (including protection of iconic species). The specific values relevant to each fishery, and their order of importance, will vary between countries and even between fisheries within a single country.

It is important to get agreement, or at least clarity, about what high level fishery objectives and their relative priority will be used in the remainder of the EAF planning process. The relevant questions and checklists provided below should assist with this.





## Activity 1.2 Defining the fishery, societal values and high level objectives

### Relevant questions

#### Fishery scope

- Is this a sector based, species based, method based, or area based management plan?
- Which sectors or types of fishers will be included in the plan (e.g. commercial; subsistence; artisanal, sport, charter, distant water nations)?
- What are the main species caught (e.g. shrimp, sardines, demersal fish, etc.)?
- What fishing methods are involved – just one (e.g. netting) or all relevant methods for the species (shrimp trawling, beach seining, etc.)?
- What is the geographic area it will cover (e.g. the entire EEZ, coastal waters only, a length of coast, a sub-region, etc.)?
- What government agencies and other groups are directly involved in the management of the fishery (e.g. the national fisheries agency, research institutes, police, local government, fishing associations, etc.)?
- What government and other agencies or groups are indirectly involved (e.g. environmental agencies, finance, NGOs, Regional Fisheries Management Organization)?
- What level of jurisdiction or control does each of these agencies have over the area, species, activities involved? (e.g. are there gaps or overlaps in who has legislative, policy and compliance authority?)

#### Fishery values

- What are the key community values that the fishery should be assisting (e.g. food security, economic development, ecosystem integrity, etc.)?
- What is the relative order of priority between these values and is there general agreement or strong divergence about this order between different groups?
- Are there any specific government policies that must be considered?
- Are there certain species, areas or features that have special local/national/regional significance that must be treated in a special manner?
- Are there any relevant international and national legal agreements that could affect management objectives?

## Activity 1.2 Defining the fishery, societal values and high level objectives


### Key actions

- Identify and agree on which fishing activities, sectors, communities, target and non-target species, ecosystems, geographic regions are to be covered by the EAF Management Plan.
- Identify any other key activities, stakeholder groups, government agencies, etc. that need to be included in the planning process (directly or indirectly) to enable its effective and successful implementation.
- Clarify who has legislative and/or policy control for the activities, areas and people to be covered in the management plan.
- Generate an agreed set of key values and outcomes the community and government want the fishery management plan to generate or maintain.
- Identify possible conflicts between objectives and determine what hierarchy or precedence will be used.
- Use the agreed key values and outcomes to generate the set of high level fisheries management objectives that will be used as the basis of the EAF planning process.

### Tools

In addition to the relevant questions outlined above, there are a number of technical manuals on EAF that offer checklist guides that can assist management planners in identifying or clarifying the scope for the fishery/sector concerned. Stakeholder engagement and agreement can be sought at a scoping meeting using a professional facilitator or one of the members of the project team who is trained for this purpose. Given the importance of agreement on the scope and values, having good facilitation at the stakeholder meeting will be vital to the overall success of the entire planning process.

A variety of consultation and community engagement tools can assist in generating effective input from the community at a scoping or stakeholder meeting. Attempting to reach agreement (or at least gain their input) on what objectives the fishery should be trying to achieve, should increase the chances that they will accept the planning outcomes. This includes brainstorming, Participatory Rapid Community Assessment (PRCA) and visioning exercises to determine the breadth of values and to gain agreement on the relevant values for the fishery, but particularly their order of priority. One of the various consensus building tools can be used. The selection criteria for these tools are given in the table below.

 Tools and information sources	Page	Selection criteria					
		Difficulty	Cost	Capacity	Know.	Participation	Time
Consultation tools	50						
Participatory Rapid Community Assessment	85	Moderate	M	M	M	M	M
Visioning exercises	88	Moderate	L	L-M	L	M-H	S-M
Brainstorming	*	Easy	L-M	M	L	M-H	S-M
Fishery scope checklist	*	Easy	L	L	L	L-H	S

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)

L = Low or Long    H = High    M = Medium    S = Short

## Activity 1.3 Finalise the scoping and background document

### Overview of the activity

Having clarified the scope of the fishery and the main community values for the management plan, it is useful to identify and preferably document all relevant information on the fishery in a scoping document by updating the EAF Baseline Report.

Relevant information includes any current fishery policy and management documents plus any overriding national policies, legislation or treaties that may constrain and guide how the management planning process proceeds. Information on fishery activities, such as catch and effort and the status of the main target species available from reports and stock assessments, should be identified. Any knowledge about the broader ecosystem where the fishery operates, including critical or vulnerable habitats, endangered species, and interactions should also be identified. All social and economic information on the relevant communities that the fishery contributes to, or affects is also required.

This does not have to be formal information and in many cases much of what is known about the fishery will reside within the “heads” of key individuals who have specific expertise or experience with the fishery and its history. Such people should be encouraged to participate in the process. Where virtually no information is available, some form of rapid assessment of the fishery and the community may be valuable to undertake.

All the above information will be useful for the remainder of the EAF process, but it will be especially valuable for use in identifying issues, determining risks, setting priorities and developing management options. Therefore, it should be at least collated and preferably summarised along with the outcomes of the scoping meeting into a scoping document. It would also be sensible at this time to review the roadmap to ensure that it does not require any amendments, given the outcomes from the scoping meeting, or any constraints imposed including additional people who have been identified as required participants.

### Relevant questions

- What documented and informal information on the area, fishery, sector, stock status, ecosystem, community, etc. is available?
- Are there syntheses or summaries available?
- What specific people or expertise is needed/are available (e.g. in the research laboratory, the Ministry, the regional fishery secretariat) to be involved in other parts of the EAF planning process?

### Key actions

- Identify and compile any available information on the fishery, the key target and other species and the ecosystem within which it operates, including past assessments, studies or management plans.
- Collate relevant national policies or international agreements and identify any possible constraints.
- Summarise the social and economic status and issues of the fishery participants, the relevant communities and the region.

## Activity 1.3 Finalise the scoping and background document


- If needed, complete a rapid assessment of the fishery and the relevant communities.
- Identify any additional individuals with specific expertise or knowledge (including traditional) who would be valuable to involve in the planning process.
- Draft an EAF scoping/baseline document that includes the outcomes of the scoping exercises and an appropriate summary of identified information.
- Present the completed document to stakeholders and revise as necessary.
- Review the roadmap and amend as necessary.

## Tools

To assist in this process an outline structure of a EAF Baseline Report consisting of an annotated set of draft headings has been generated. This will help by making it clear what types of information could be useful for the remainder of the EAF process. There are also a number of tools that can assist in data synthesis for spatially-based data, including low cost participatory mapping tools and various computer based GIS and related tools. There are also a large number of stock, social and economic assessments that can be used to provide useful background for the issue identification process that will occur next in the EAF process.

Community consultation tools outlined previously could be of value, as will a rapid community assessment, if this is required.

The selection criteria for these tools are given in the table below.

 <b>Tools and information sources</b>	<b>Page</b>	<b>Selection criteria</b>					
		<b>Difficulty</b>	<b>Cost</b>	<b>Capacity</b>	<b>Know.</b>	<b>Participation</b>	<b>Time</b>
Consultation tools	50						
Description for completing an EAF Baseline Report	63	Easy	L	L	L	M	S-L
Participatory Rapid Community Assessment (PRCA)	85	Moderate	L-M	M	L	M	M
Participatory sketch, scale and photo mapping	90	Easy	L	L-M	L-M	M-H	S
Social and economic assessment methods	91	Moderate	L-H	L-H	L-H	L-H	S-L
Quantitative stock assessment methods	99	Moderate	L-H	L-H	L-H	L-M	S-L
GIS based tools for data synthesis and analysis	101	Fairly Hard	M-H	M-H	M-H	L-M	M-L

L = Low or Long    H = High    M = Medium    S = Short

## Step 2 Identification of assets, issues and their priority

### Step overview

Based on the agreed scope of the fishery and the community values to be achieved, the next step is to identify and examine all issues relevant to the fishery to decide where to focus the management system to generate the best community outcomes. To assist with this process, the issues can be separated into the three EAF component groups:

1. Ecosystem wellbeing – All ecological “assets” (e.g. stocks, habitats, ecosystems) relevant to the fishery and the issues/impacts being generated by the fishery that may be affecting them.
2. Human wellbeing – The social and/or economic “outcomes” currently being generated by the fishery; both the good – those outcomes the community wants to have generated (e.g. food security, economic development), and the bad – those it wants to avoid (e.g. conflicts; injuries).
3. Ability to achieve – The management and institutional “systems” in place or proposed to deliver the wanted outcomes (e.g. access and tenure systems, compliance, democratic processes, conflict resolution), along with the external “drivers” (not controlled by the fishery) which may be affecting performance.

Because a large number of assets and issues can be identified, the key part of the whole EAF process is to ensure only the most important issues are addressed by direct management intervention. This requires determining their relative priority using some form of risk assessment and/or prioritisation procedure based upon the fishery trying to deliver the hierarchy of community objectives and values, not just the ecological ones. Without effective prioritisation of the identified issues, the remainder of the planning process will almost certainly fail.

### Key activities

- 2.1 Asset and issue identification.
- 2.2 Issue prioritisation and risk assessment.



### Main outputs

- I. A complete set of EAF-related issues sorted into ecological assets, social and economic outcomes, governance systems and the threats, drivers and impacts relevant to the fishery.
- II. The relative level of risk and priority, plus the recommended level of direct management action or other specific activities, needed to deal with each of the issues.



## Activity 2.1 Asset and issue identification

### Overview of the activity

Based on the scope and values of the fishery, the next step, which is central to the entire EAF process, is to identify all the relevant issues (assets, outcomes, systems and drivers) associated with the fishery across each of the EAF components (ecological wellbeing, human wellbeing and ability to achieve).

The identification process must cover all direct and indirect impacts generated by the fishing activities on retained and non-retained species, and the broader ecosystem; plus the wanted and unwanted social and economic outcomes on both the fishers and the community. The process should also identify all the elements needed to enable the effective governance and administration of the fishery, including legislation, plans, consultation, compliance, etc. Finally, it also records any issues external to the management system that could affect the performance of the fishery including natural (e.g. climatic) and manmade ecological (e.g. pollution), social (e.g. international attitudes) or economic (e.g. exchange rates) impacts.

Relevant stakeholders (fishers, managers, scientists, community, etc.) should be able to raise any issues through a suitable consultation process such as interviews, surveys or, most commonly, stakeholder workshops. The consultation process must be conducted in a language common to the participants and they must be given sufficient instructions on the purpose and process before beginning.

A number of workshop tools can assist with effective issue identification and structuring. These may include brainstorming, checklists, component trees and impact-asset matrices. These can be used separately but also in combination to help ensure (i) good participation; (ii) that comprehensive sets of issues are generated; and (iii) these are sorted into the relevant EAF categories to facilitate their alignment with one or more of the high level fishery management objectives.



Photo: G. Bizzarri/FAO

## Activity 2.1 Asset and issue identification

### Relevant questions

- What are the ecological assets which are being impacted directly or indirectly by the fishery, and how specifically is the fishery impacting them? This covers all the retained and non-retained species, the broader ecosystem - including habitats and endangered species - that the fishery may be impacting and therefore the management plan may need to control.
- What are the social and/or economic outcomes (both good and bad) currently being generated by the fishery (or impacting on the fishery), plus what outcomes does the community want to have generated in the future? This should relate to the community values identified in the scoping phase.
- What governance systems are in place or required to manage impacts on the ecological assets and generate the desired social and/or economic outcomes? This should cover both the fishery management system plus any governance systems used by other agencies, the fishers or the community that may be affecting (both positive and negative) the performance of the fishery.
- What are the external drivers which may be affecting the fishery performance but are not directly controlled by the management plan? This includes activities managed by other agencies (e.g. coastal development, pollution), world scale drivers (fuel costs, markets) and natural impacts (oceanography, climate).

### Key actions

- Organize stakeholder meetings and/or interviews to identify all the issues of potential relevance to the EAF management process, related to the main direct and indirect impacts of fishing and related activities (along the entire fish production chain) on the fishery itself and on non-fishery activities.
- Identify any issues that are outside the fishery management responsibility that are affecting, or could in the future affect, the performance of the fishery.
- Sort and structure each of the issues into their relevant EAF components and clarify if the issue is an asset or objective that is to be managed and achieved; or if it is an impact or threat to one or more objectives.
- Identify which high level fishery management objectives are relevant to each of the issues raised.

## Activity 2.1 Asset and issue identification


### Tools

Stakeholder input is essential for this activity and this can be facilitated in various ways. e.g. formal workshops and focus groups using EAF presentation materials or a series of individual discussions, e.g. with representatives of the various groups. These consultation methods and tools need not be mutually exclusive and a small group of individual interviews can be used to draft a set of identified issues while a broader consultation can subsequently be arranged to formally amend and adopt the final set of issues. For widely dispersed stakeholders, or where large numbers are involved, surveys or questionnaires may be more appropriate.

There are also a number of specific tools available to enhance the level of participation in issue identification (brainstorming and card storming) within workshops or focus groups. There are tools to help ensure all relevant EAF issues are identified (component trees, checklists, conceptual models) and sorted into categories (objective – impact matrices).

The tools used should match the stakeholders' capability and the environment where the meetings will occur. Addressing subsistence or other community-level fisheries on a beach will require fewer formal/technical processes to be effective. For meetings with government officials and large scale fisheries in a formal environment, use of computer-based methods is common. It is often best to use a combination of tools but in all cases, the assistance of expert facilitation helps greatly and the discussions (along with any reference material) should always be in the common language of the audience.

The selection criteria for these tools are given in the table below.

 <b>Tools and information sources</b>	<b>Page</b>	<b>Selection criteria</b>					
		<b>Difficulty</b>	<b>Cost</b>	<b>Capacity</b>	<b>Know.</b>	<b>Participation</b>	<b>Time</b>
Consultation tools	50						
EAF component trees	102	Moderate	L–M	M	L	M	S
EAF component lists	109	Easy	L	L–M	L	M	S
Asset/objectives – impact/ threat matrix	113	Moderate	L–M	M	L	M	S
Conceptual and qualitative modelling	*	Moderate	M	M	M	L	S
Card storming	*	Easy	L	L	L	M–H	S
Brainstorming	*	Easy	L	L–M	L	M–H	S

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)

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## Activity 2.2 Issue prioritisation and risk assessment

### Overview of the activity

A large number of issues can be generated through the issue identification process, even for a small fishery. It is therefore essential to determine their priority to decide if you should, or should not, be undertaking any direct management actions to ensure the appropriate use of what are usually scarce resources.

Most robust prioritisation processes are based on risk assessment principles because these directly assess the likelihood of not achieving acceptable performance against each relevant management objective. Because risk includes uncertainty, these assessments can be completed with little or no quantitative data. We deal daily with risk and uncertainty (even activities such as crossing a road) but generally we don't realise it. Risk assessment principles enable us to make the most informed decision with whatever information is available.

To determine the priorities for the fishery, the approach taken is to ask – what is the risk that the current fishery management system will not meet its agreed objectives for each of the identified issues? Where the current or anticipated future performance of the fishery is not considered acceptable, direct management actions would need to be applied.

If an issue is associated with more than one objective (e.g. target stocks often have economic and/or social objectives in addition to stock sustainability), the performance for each of these should be assessed separately as the risks may differ. If a number of issues have high or unacceptable risk ratings, additional prioritisation that considers their relative importance to community outcomes may be needed to determine which of these issues should be addressed, or in what order.

## Activity 2.2 Issue prioritisation and risk assessment

### Relevant questions

#### For each issue:

- Which high level objectives (ecological, social, etc.) are relevant for the issue being examined?
- With the current management arrangements, are you happy with the current or likely future performance of the fishery for each of the relevant objectives?
- If you are happy with the performance, is this outcome the direct result of the current set of management arrangements and actions which then need to be continued, or merely an indirect effect and no direct actions are needed?
- If you are unhappy, how unhappy are you, and is this something that can be directly improved by changing the management arrangements (e.g. reducing catch or effort) or is the problem outside your control and can only be taken into consideration (e.g. exchange rates).
- Which of the high risk issues is/are considered to be the most important to address, based either on its alignment with the high level objectives, or if it affects the most outcomes.

### Key actions

- Individually assess the specific risk or relative priority for each identified issue.
- Obtain stakeholder feedback on risk outcomes.
- Examine any relationships or interactions between issues and their associated objectives.
- Decide which issues will or will not be directly managed by the management plan.
- Determine which of the issues should be dealt with first and/or the relative level of resources that should be applied.



## Activity 2.2 Issue prioritisation and risk assessment

### Tools

There are a number of different methods available for use which can be separated into categories; including informal vote and simple risk ranking which can operate with minimal levels of data and, consequently, higher levels of direct stakeholder involvement. There are also a number of more formal qualitative risk assessment methods, which require more information and a greater technical capacity. Two common versions are the Consequence x Likelihood based methods (for qualitative analysis of ecological, social and economic components), and the Qualitative risk analysis (SICA) based method (for qualitative ecological analysis). Where more data and technical capacity are available, semi-quantitative methods such as Productivity Susceptibility Assessments (PSA) that examine the inherent vulnerability of a species may be useful. Even fully quantitative risk methods can be used by fisheries with sufficient data and access to specialists in simulation modelling.


To compare priorities between issues that may have similar individual risk scores or levels, simple informal vote ranking methods are useful, especially where the comparison of priorities is between different social or economic issues. More complicated multi-criteria analyses can be used to separate high risk issues where there is sufficient information and agreement about the criteria to use.

Different consultation methods can be used to assess the risks for different types of issues and objectives. The type of audience can also affect what may be the best method. Furthermore, the different methods can sometimes be used in combination to obtain the most effective input from different stakeholder groups and therefore the most robust and accepted priorities. For the highly technical analyses that involve complicated methods, only a small number of individuals effectively participate (but a broader group can be observers). Therefore, the best consultation mechanism can vary from the use of a single expert to obtaining input from the entire community.

- Is the issue of a technical or scientific nature or community value-based? The more technical, the greater the weight which may need to be placed on expert opinion. For community value-based issues, stakeholder input will generally be the most important.
- How much relevant information is available? With less information available, less sophisticated methods are probably more appropriate.
- What is the capacity and technical knowledge of the stakeholders who will be involved? Lower capacity will mean less technical tools should be used.
- What is/are the best combination(s) of risk tools and consultation method(s) given the resources and information available?

The selection criteria for these tools are given in the following table.

## Activity 2.2 Issue prioritisation and risk assessment

 <b>Tools and information sources</b>	Page	Selection criteria					
		Difficulty	Cost	Capacity	Know.	Participation	Time
Consultation tools	50						
Non formal risk categories	117	Easy	L	L–M	L	H	S
Qualitative risk analysis (C x L)	120	Moderate	L–M	L–M	L	M	S
Quantitative risk analysis	130	Very Hard	H	H	H	L	L
Dot based ranking and prioritisation methods	132	Easy	L	L	L	H	S
Multi-criteria decision analysis	134	Moderate	L–M	M	L–M	L–M	S–M
Qualitative risk analysis (SICA)	*	Fairly Hard	M	M	M	L	M
Productivity Susceptibility Assessments (PSA)	*	Fairly Hard	M	M	M	L	M

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)

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## Step 3 Development of management systems

### Step overview

After identifying which issues (ecological, social, economic or institutional) require direct intervention, the next step is to develop a management system that will deliver successful outcomes. This requires clearly determining specifically what you want the fishery to achieve for each issue and why. These operational objectives need to be clear, measurable and directly linked to one or more of the high level objectives.

To ensure each operational objective is being achieved requires some way of measuring if the management system is working or not. This involves having one or more indicators to measure performance, plus having performance measures (limits, targets, thresholds, etc.) that clearly describe what levels of the indicator define acceptable performance. The operational objective, indicator and performance measure together form a package; none are useful without the other two.

The other critical part of the management system is to determine what combination of management measures will most likely achieve each of the operational objectives given the available resources and any other constraints. This involves assessing which of the current management arrangements have deficiencies or inefficiencies and identifying potentially better alternatives. Each option should be evaluated based on its cost effectiveness, impact on risks and objectives, likelihood of adoption, etc. to determine which is the most appropriate.

#### Key activities

- 3.1 Determine operational objectives.
- 3.2 Indicator and performance measure selection.
- 3.3 Management option and evaluation selection.



#### Main outputs

- I. Development of a set of clear and appropriate operational objectives covering each of the issues that requires direct management.
- II. Identification of one or more indicators and their associated performance measures that can be used to monitor the performance of each operational objective.
- III. Selection of the most cost effective set of management arrangements designed to generate acceptable levels of performance for all operational objectives.



# Activity 3.1 Determine operational objectives

## Overview of the activity

After identifying which of the issues (of an ecological, social, economic or institutional nature) requires specific management intervention, the next step is to clearly determine what management outcomes are to be achieved. This requires the generation of clear and measurable operational objectives for each of the priority issues.

Operational objectives are the translation of the relevant social values, high level objectives, policy statements and standing legislation, etc. (identified in the scoping phase) into a form that has a direct and practical interpretation for the management of the fishery. They need to be outcome-based and can best be described by answering: "For this issue, what do you want the fishery to achieve and why?"

They should clearly describe the expected outcome of management (e.g. maintain the biomass at levels that can generate MSY); they must be measurable using either quantitative or qualitative indicators, and potentially auditable.

In cases where an issue (e.g. a depleted target stock) involves multiple objectives (e.g. increase biomass levels to MSY but still contribute to food security) that can potentially be in conflict, it will be necessary to determine the order of priority and timeframe for achieving success.

Operational objectives should therefore be developed in consultation with stakeholders because they define precisely what the management plan is designed to achieve and therefore what fishing and other arrangements may need to change.

It is recognized that it can sometimes be difficult to develop operational objectives without also needing to identify the relevant indicator and performance level as these form a package. It may, therefore, be more practical in many cases to combine activities 3.1 and 3.2 as a single process.

## Relevant questions

**For each issue you are going to directly manage:**

- What are the high level management objectives relevant to this issue and what specifically does this mean the fishery should be trying to achieve for this issue?
- Are any of the outcomes for the issue in conflict with each other, if so what is the order of priority?
- Is there stakeholder agreement on what outcomes should be targeted?
- Can the outcome be measured either by quantitative or qualitative methods?
- Are the agreed set of operational objectives and outcomes for the issue still consistent with the high level objectives, other policies, treaties, legislation, etc.?

# Activity 3.1 Determine operational objectives

## Key actions


- For each issue requiring direct management, identify possible operational objectives.
- If there is more than one operational objective for an issue, determine their hierarchy or relative priority.
- Obtain stakeholder input/advice on their appropriateness and practicality.
- Review operational objectives to ensure they are consistent with high level objectives, legislation/policies.
- Confirm the set of operational objectives that will be used for developing the management system.

## Tools

As the operational objectives for a fishery will relate to the specific circumstances in that area, there are not many direct tools to assist with this activity. Examples of EAF based operational objectives have been collated from the numerous case studies that have been completed for various fisheries. These cover each of the categories of EAF issues (e.g. retained species, the ecosystem, social issues, economics, governance) and these examples may be useful for finding the right objective, or at least to identify a starting point.

The process of determining operational objectives may generate conflict if there is disagreement between stakeholders about what is being attempted; therefore the consultation tools related to conflict resolution may be required.

The selection criteria for this tool are given in the table below.

 Tools and information sources	Page	Selection criteria					
		Difficulty	Cost	Capacity	Know.	Participation	Time
Consultation tools	50						
Examples of operational objectives for use in EAF	137	Easy	L	L	L	M	S

L = Low or Long      H = High      M = Medium      S = Short



## Activity 3.2 Indicator and performance measure selection

### Overview of the activity

The purpose of this activity is to identify relevant and cost effective indicators and their associated performance levels that can be used to monitor the success of the management plan in meeting each of the operational objectives. Therefore, across the fishery, a combination of ecological, social, economic and institutional indicators may be needed.

An indicator can be a quantitative or qualitative measure of some attribute of the fishery that is directly measured (e.g. percentage habitat trawled area using GPS tracks), estimated using a model (e.g. biomass estimated using a stock assessment model), measured indirectly (surrogate measures of biomass such as catch rates) or even just inferred (e.g. social unrest as an indicator of local attitudes to management). To interpret the indicator in relation to the operational objective, you need to determine what distinguishes acceptable performance from unacceptable performance with these performance measures (or reference levels) taking a number of forms (e.g. limits, targets, suitable ranges, trends, etc.).

More than one indicator (and their associated performance measures) may be used to monitor performance of the same operational objective (e.g. both fishery-based and fishery-independent biomass estimates). This can provide greater confidence where none is considered accurate by itself, but requires determination of how indicators will be collectively interpreted to track performance when they show differing trends.

The precision of both the indicator and the performance levels must match the level of precaution used in the management setting. Where the risks are low, crude indicators may be adequate. The selection of the indicator and performance limits must be done as a package with the determination of the level of complexity and precaution of the management responses. Where the inherent risks are higher, or the management approach is more aggressive, more robust and precise indicators and performance limits will be needed. The alternative is for the management to be more precautionary with appropriate adjustments made to the acceptable performance limits.

## Activity 3.2 Indicator and performance measure selection

### Relevant questions

- Is there already an indicator being used?
- What levels of the indicator define acceptable performance for the objective and why?
- How precise/robust does the indicator and performance measure need to be to match the risk profile of the fishery?
- What resources are there to spend on their measurement?
- Would the cost of moving to a more robust indicator be worth the additional expense?
- Are the resources sufficient to maintain the indicator system as long as needed – are the proposed indicators compatible with monitoring and evaluation capacity available?
- If there is more than one indicator/performance measure to be used for the objective, how will they work together to determine the assessment outcome?
- To what degree should the indicator/performance measure/management system be formalised? Is it appropriate to generate harvest strategy/control rules?

### Key actions

- Identify possible indicators to measure performance for each operational objective.
- Agree on what is considered acceptable performance for the objective and why.
- Agree on the level of precision and accuracy required.
- Review what data/information are available and relative costs for each possible indicator given their relative uncertainty.
- Determine the most cost effective options.
- Given the levels of uncertainty in the indicator, determine what will signify acceptable and unacceptable performance.
- If more than one indicator/performance measure is to be used for the objective, determine how they will work together to determine the assessment outcome.

## Activity 3.2 Indicator and performance measure selection

### Tools


Indicators and performance levels related to measuring the targeted fisheries resources are well known and tested, plus many of these can be extended to non-target species. Some of the reviews go into detail about how each of the indicators behave for different issues and in different situations. Broader ecosystem indicators, and especially the levels that represent acceptable performance, are more problematic but more examples and a number of reviews of these now exist. For the social and economic objectives there are many potential indicators but relatively few applications have been made to fisheries, especially in an ongoing monitoring programme.

The challenge for all fisheries is to select indicators that are affordable and match the sophistication of the management system. For small-scale and low value fisheries this may require the stakeholders to directly generate most of the information used to track performance.

Most of the reviews only cover one category of EAF issues (e.g. capture species, ecosystem, social, economic, etc.) and specific summary reviews have been and are currently being generated by FAO to assist with finding the right performance monitoring system. A number of EAF manuals and summaries are also available that catalogue many of the relevant indicators across the full spectrum of EAF categories and there are a number of examples of Community Based Monitoring systems.

As EAF is an adaptive management process there needs to be a clear link between the system of indicators and the performance measures with the management cycle (see Activity 4.2). One formal mechanism to link the indicator and performance measures with management is the use of harvest strategies or harvest control rules to establish pre-agreed courses of action. These are becoming more common. They assist with the transparency of decision making and provide more certainty for industry, but they do require a reasonable level of knowledge and monitoring data to function effectively.

The selection criteria for these tools are given in the table below.

 <b>Tools and information sources</b>	<b>Page</b>	<b>Selection criteria</b>					
		<b>Difficulty</b>	<b>Cost</b>	<b>Capacity</b>	<b>Know.</b>	<b>Participation</b>	<b>Time</b>
Consultation tools	50						
Reviews and summaries of indicators and performance measures for use in EAF	144	Easy	L–M	M	L–M	L–H	S
Community based monitoring	151	Easy	L	L	L	M–H	S–M
Harvest strategies and control rules	153	Fairly Hard	M	M	M	L–H	S
Collecting fishery data for performance monitoring	*	Easy	L–H	L–M	L	L–H	S–M
* Detailed tools fact sheet available at <a href="http://www.fao.org/fishery/eaf-net">www.fao.org/fishery/eaf-net</a> L = Low or Long    H = High    M = Medium    S = Short							



## Activity 3.3 Management option evaluation and selection

### Overview of the activity

Having determined the set of operational objectives, indicators and performance measures for the fishery, the next action is to produce an agreed and coherent set of management measures that should generate acceptable levels of performance. This involves the identification of potential management options and some level of evaluation to determine which of these will be the most practical and appropriate given the fishery's value, location and the level of resources available (human, financial and information).

There are many options for management arrangements based on some combination of limiting access, vessels, gear, catch, areas, time, etc. and there are many books, manuals and reports that provide guidance on choosing the most appropriate options. The process for identifying the draft set of measures can be initiated by the management authority, but their evaluation and refinement should always involve stakeholders (especially fishers and compliance officers) to ensure that any proposals are practical/enforceable, which generally increases their acceptance and adoption.

The evaluation of which are the best options may simply involve the qualitative consideration of each option by those involved in the management of the fishery using some form of expert judgement. Alternatively, a number of quantitative methods are available to assist. These include quantitative stock/bioeconomic assessments that examine single objectives; Management Strategy Evaluation (MSE) that includes management and stakeholder processes; and Ecosystem and Agent-Based Models (ABMs) that can assess the management package against multiple objectives. A number of GIS based tools can assist in determining appropriate boundaries for spatially based management systems.

Clearly, the more complex the assessment method, the more demanding it is in data, time and resources.

### Relevant questions

- How complex a management plan can you afford, and what are you capable of implementing? What are the management resources available to implement the measures?
- What types of management measures have worked or not worked in similar types of fisheries? Are there local conditions or constraints that would make some management measures more or less likely to succeed?
- Are all high priority issues to be covered? Have we identified all possible interactions between them and are there any synergies that can make the plan more efficient?
- Have we achieved overall coherence within the plan, within the sector and with national policies?
- What is the timeframe that stakeholders think acceptable for the management measures to produce the expected outcomes? Are there interim actions that can be taken before it is finalised?
- What is the likely chance of success of the proposed management package and how does this fit with the risk profile of the stakeholders and government?
- How practical (in terms of costs and likely degree of community acceptance) is it to implement?

## Activity 3.3 Management option evaluation and selection

### Key actions

- Identify possible alternative and complementary management measures to meet the objectives of each issue.
- Evaluate each of the possible management options available to deal with one issue/objective and determine the best option.
- Assess the impact of the management option on other issues and other objectives.
- Adjust the overall set of options to minimize unwanted interactions and maximize synergy between options.
- Outline what management actions will occur if a future assessment shows that performance for the issue/objective is not acceptable. This may imply fine tuning of the management measures or the updating of the entire management planning cycle.
- Review the set of indicators and performance measures for each issue to ensure they are still the most cost effective.
- Ensure there are sufficient resources to undertake the agreed set of management measures including monitoring of all their associated indicators.

### Tools

New management options could be identified through the use of existing management theories and manuals. For example, a desktop assessment of what has worked or not worked in similar situations may be considered. There are numerous fisheries management manuals that outline the types of management measures available. These can be divided into a number of categories based on the type of fishery control (e.g. gear-based or area-based measures, effort control or catch allocation). Some cover specific issues (e.g. by-catch reduction, destructive fishing, post-harvest handling), while others describe specific management methods (e.g. quotas, MPAs) and governance measures (e.g. fisheries enforcement and compliance, safety at sea, community based, access rights, incentives). In addition to the formally documented options, inspiration could also come from the stakeholders themselves if the participation has been effective. Therefore, mobilization of traditional knowledge may be required and there are now manuals that outline Community Based Management options.


Evaluating options can be completed by collective expert judgement or expert panels using the collective thoughts of those with direct experience in management. More formal methods include cost-benefit analyses, which may involve some form of quantitative techniques. For single issues such as determining actions for stock management, the more complicated methods involve the use of quantitative stock or bio-economic simulation models.



## Activity 3.3 Management option evaluation and selection

To assess many issues simultaneously, expert advice is still useful and the simplest tool for this purpose is Multi-Criteria Decision Analysis (MCDA). If the examination of the robustness of the management arrangements is to be formally examined, especially to include uncertainty about the management process, Management Strategy Evaluation (MSE) approaches can be useful, but only if there are sufficient data to support them. For even more data hungry approaches, there are a number of integrated assessment models some of which have reached a high level of complexity (e.g. Atlantis) and have been reviewed by the FAO. For spatially based management systems there are now a large number of GIS based decision support tools that can assist in the selection of appropriate boundaries and zoning.

The selection criteria for these tools are given in the following table.

 Tools and information sources	Page	Selection criteria					
		Difficulty	Cost	Capacity	Know.	Participation	Time
Option identification							
Consultation tools	50						
SWOT analysis	76	Moderate	L	L–M	L	M–H	S
Management manuals and reviews	155	Moderate	L	M	L	L–M	S–M
Fisheries enforcement and compliance	158	Moderate	M–H	M–H	M	L–M	M–L
Summaries of possible EAF based management responses	*	Easy	L	M	L	L–M	S
Community based techniques	*	Easy	L	M	L	M–H	M
Root cause analysis	*	Moderate	L	M	M	L–M	M
Evaluation							
Consultation tools	50						
Cost-benefit analysis	80	Moderate	L–M	M	M	L	M
Social and economic assessment methods	91	Fairly Hard	M–H	H	H	L	L
Quantitative stock assessment methods	99	Fairly Hard	M–H	H	H	L	L
GIS based and related decision support tools	101	Fairly Hard	M–H	M–H	M–H	L–M	M–L
Multi-Criteria analysis	134	Moderate	L	L	L	L–M	S–M
Managment Strategy Evaluation (MSE)	159	Very Hard	M–H	H	H	M–H	L
Review of quantitative ecosystem models	161	Very Hard	H	VH	VH	L	L
Expert judgement or analysis	*	Easy	L	L–M	L–M	M–H	S

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)

L = Low or Long    H = High    M = Medium    S = Short

## Step 4 Implementation, monitoring and performance review

### Step overview

Implementing a new management system can be helped by generating an operational plan that outlines, in detail, what would need to be done by whom, by when, and where. This includes identifying all the activities that need to change, any additional activities needed, plus those activities no longer needed. The complete set of the required activities and their timelines with the resources available should show whether the proposed set of management arrangements is feasible or if they need to be revised.

When the feasibility of the system is confirmed, all proposed fishery management actions and arrangements need to be incorporated into a formal Fisheries Management “Plan” which has an appropriate legal basis. This can require drafting legislation or regulations but for community-based fisheries other, less formal, documentation may be applicable.

Monitoring, evaluation and review of performance is a critical step in the adaptive management planning process. It is essential both to ensure adequate performance is being generated against current objectives and also that the fishery is maintaining relevance with community expectations. The review process includes three inter-related cycles.

1. **Frequent reviews of the operations** to determine if each of the activities outlined in the operational plan is being undertaken or not.
2. **Periodic reviews of the outcomes** to determine whether the activities undertaken are generating an acceptable level of performance in relation to each issue.
3. **Infrequent review of the entire EAF plan.** After a pre-determined period, or if a major crisis occurs, review the entire management system to check if it is still relevant to the communities' current circumstances.

The real “final” activity in the management process is to regularly report the outcomes of the management system to all stakeholders so they can consider whether the performance against each of the objectives has been acceptable or not.

### Key activities

- 4.1 Develop an operational plan and monitor its progress.
- 4.2 Formalization of the management plan.
- 4.3 Review performance of the management system.
- 4.4 Reporting, communication and auditing of performance.



### Main outputs

- I. Creation of a detailed operational (implementation) plan.
- II. Formal adoption of the EAF based management plan.
- III. Regular reports on level of activities completed to execute the operational plan.
- IV. Periodic reports on the performance of the entire management system in generating acceptable performance for each of the operational objectives and overall community outcomes.

## Activity 4.1 Develop an operational plan and monitor its progress

### Overview of the activity

Having an agreed set of management measures to deal with each of the key issues for your fishery is good, but to be useful they need to be implemented. The translation from policy to action is, however, often not done well. Developing an operational plan that precisely identifies all the activities and processes that need to be undertaken, by whom and when, can reduce the chances that your EAF Management Plan becomes another document gathering dust on a shelf.

Generating an operational plan requires going through the full set of EAF management measures developed in Activity 3.3 and determining (i) what are the specific activities that need to be completed; (ii) who are the actual persons/institutions that will be responsible for completing these activities; and (iii) whether there are really enough resources (both people and financial) to complete each of the tasks. It is not until after this detailed analysis is done that you can be confident that your proposed management arrangements are feasible.

The operational plan will usually be developed by the management agency, given that their staff and resources are most often required. If specific actions are to be undertaken by other groups, they need to be involved in planning for these activities. The plan should include a schedule of activities and responsibilities with clear milestones. It should be monitored regularly to ensure adequate progress is being made, with regular reviews (at least once every six months) undertaken to see if the plan is being implemented successfully or if any revisions are required.

The operational plan can be a simple text document, a spreadsheet or produced by project management software.

## Activity 4.1 **Develop an operational plan and monitor its progress**

### **Relevant questions**

#### **Development of operational plan**

- What are the various tasks needed to implement the management plan?
- Which institutions and who precisely from these institutions will need to undertake each of these tasks/activities?
- What activities are interlinked and when do specific milestones need to be set to ensure overall progress can be made?
- Are there sufficient resources (both human and financial) to complete each of the activities in the plan, now and into the future?
- Clearly allocate and communicate to the various staff and stakeholders the individual tasks necessary to implement the Management Plan.
- Determine how formal the operational plan should be.

#### **Monitoring and review of progress**

- Are those allocated responsibility for completing a task in the Operational Plan doing what they are supposed to be doing?
- Was the task specification explicit enough?
- Do they consider their action as a necessary part of the process and of their role in the agency?
- Do they have the capacity to do what is expected from them now and in the future?
- Is there a need for support to improve effectiveness?
- Is there a need to review the timelines, the person responsible or even the scope of the task itself?



## Activity 4.1 Develop an operational plan and monitor its progress

### Key actions

- Develop an operational plan that clearly identifies the roles and responsibilities (and resources) for undertaking each of the required activities and establish timelines and milestones.
- Develop specific activity plans for each of the groups in charge of implementing the plan in its various elements (e.g. research group, compliance group, policy group, industry, information management, others).
- Reassess whether the agreed management plan is feasible with the current resources available - if not then you will need to return to Activity 3.3.
- Develop communications plans to inform all relevant stakeholders of what actions will be occurring and when.
- Agree on time scales for the review of each major element.
- Establish the consultation and review processes (including external audit). Define its TOR, including the adaptive management environment.
- Monitor the execution of the EAF Management Plan, making sure that each of the activities outlined in the operational plan is being undertaken as planned.
- Develop/improve implementation capacity if necessary.

## Activity 4.1 Develop an operational plan and monitor its progress


### Tools

To assist with this process, operational planning templates and a checklist of common activities are available in some of the EAF guides. These outline the nature of the activity, the designated implementation unit/institution, the time frames, the expected outputs, etc. which might be sufficient in most cases.

There are also many generic project planning steps and project management guides, plus a large number of project management software packages (some of which may be used free of charge). These software systems can, however, be complicated and if not used routinely can waste time in the initial start up and input of data.

Some form of communication strategy will often be needed to ensure those who need to know what is required of them are adequately informed. This includes not only communication within the management agency but also with all important stakeholders, in other agencies and in the industry and the community.

The selection criteria for these tools are given in the table below.

 <b>Tools and information sources</b>	<b>Page</b>	<b>Selection criteria</b>					
		<b>Difficulty</b>	<b>Cost</b>	<b>Capacity</b>	<b>Know.</b>	<b>Participation</b>	<b>Time</b>
Consultation tools	50						
Operational plan template and checklist	163	Easy	L	L	L	L–M	S
Communication templates and tools	*	Easy–Mod	L	M	M	M–H	M
Project planning steps	*	Moderate	M	L	L	L	M
Project planning and management software	*	Fairly Hard	M–H	M–H	M	L	M–L

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)

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## Activity 4.2 Formalization of the Management Plan

### Overview of the activity

To implement the agreed set of management arrangements it is often necessary to have them formalised into a Management Plan. Depending upon the jurisdiction and fishery, this Management Plan may need to be a formal, legal document, in some cases requiring parliamentary approval. At the other end of the spectrum it may be as simple as a list of activities agreed to, and maintained by, the local community leadership.

It is therefore necessary to determine what level of formality is required for the Management Plan to ensure that the specific arrangements are both legally and socially enforceable by the relevant authority or groups. This may involve a central management authority, local/regional authorities or local community leaders or some combination of these. There is little chance of success if the plan is not endorsed by those who interact with, monitor and “police” the people undertaking the fishing activities.

In cases where the plan requires new or modified regulations or changes to the legal framework (e.g. the Fisheries Act) the drafting process could be assisted by viewing good examples from elsewhere and having access to legal experts. When drafted, these revisions usually involve formal approval by parliament/government which may require specific consultation with politicians and their advisors. Having stakeholder support for the proposed changes will clearly aid in getting government approval.

Once a new or revised Management Plan has been formally approved it is vital that this is communicated to all the stakeholders who could be affected by any changes to their previous activities.

### Relevant questions

- How formal does the Management Plan have to be to become valid for use? Is it an act of parliament, regulations, policy document, or set of recommendations?
- Which are the agencies and groups that need to approve the Management Plan to make it sufficiently binding? How binding should it be (could it be voluntary)?
- Will the plan require amendments to any legislation or regulations? Does this involve a parliamentary vote of support?
- What will the timeframe be for completing all these processes? Is it compatible with the urgency of the matter? What interim steps could be taken using the current set of legislative tools?
- Is sufficient legal expertise available to complete drafting? If not, where could it be obtained and at what cost?



## Activity 4.2 Formalization of the Management Plan

### Key actions


- Based on the agreed operational plan, develop a suitably formal fishery Management Plan.
- Get legal assistance as needed.
- Have the plan, including any required changes in the legislation and regulations, supported by all relevant agencies and preferably all stakeholder groups.
- Have the plan approved/endorsed by government (including any required changes in, or new, legislation and regulations) or other relevant authority.
- Communicate outcomes of the approval process to stakeholders.

### Tools

There are only a few specific EAF tools available to assist with the formalization of management plans. Some practical assistance may be gained from manuals that outline how to generate good legislation, regulations and other legal documents (best practice manuals). Assistance may also be gained from best practice examples of fishery management plans in similar circumstances and even the checklist of management system requirements located in various EAF guides. Where required, it may be possible to obtain legal drafting assistance from regional organizations or locally-based experts.

A number of communication tools are available and the communication templates will be similar to those outlined previously in the process.

The selection criteria for these tools are given in the table below.

 <b>Tools and information sources</b>	<b>Page</b>	<b>Selection criteria</b>					
		<b>Difficulty</b>	<b>Cost</b>	<b>Capacity</b>	<b>Know.</b>	<b>Participation</b>	<b>Time</b>
Consultation tools	50						
Examples of best practice management plans	167	Easy	L	M–H	M	L	M
Communication templates and tools	*	Easy	L	L	M	M–H	M
Comprehensive EAF and related management planning guides	*	Easy	L	M	L–M	L	S–M
Reports on best practice legal requirements	–	Moderate	L–M	M–H	M	L	M
Legal assistance	–	Fairly Hard	L–H	L	L	L	M–L

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)

– No fact sheet available in the EAF Toolbox, but information is available online.

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## Activity 4.3 Review performance of the management system

### Overview of the activity

EAF is an adaptive management system that requires regular checking to ascertain whether the plan is delivering acceptable outcomes for all the objectives of the fishery. Where performance is not acceptable, changes to the management measures are required. At longer time intervals the entire management system, including targeting objectives, should also be reviewed.

Monitoring the outcomes of a management system based on the identified indicators is an ongoing activity with the goal of assessing performance against each of the operational objectives at appropriate time intervals. For most commercial fisheries some level of annual review (often in connection with quota/effort allocations) is undertaken, with more frequent reviews needed where real-time management or high risk issues are involved. In some situations (e.g. small-scale fisheries, stock assessment of long lived species) a lower frequency may be adequate (e.g. every two to five years). These reviews can either be internal (most of the time) or external (from time to time).

The reviews should assess whether the management arrangements are delivering the desired outcomes and, where this is not happening, identify the likely reasons for failure and, where possible, suggest corrective actions. If these adjustments are allowed for within the scope of the plan (e.g. adjusting TAC, effort values, etc.) the change may be negotiated each time or predefined by a control rule within a formal harvest strategy. Where changes require the formal Management Plan to be amended (e.g. prohibit a certain gear) a longer process involving some of the activities from Activity 3.3 will be needed.

After the Management Plan has been in operation for some time (e.g. five to 10 years) a strategic review of the entire management system may be required. This essentially requires going back to Step 1 of the EAF planning process to ensure that the basis of the fishery Management Plan in relation to high level objectives and societal values is all still relevant.

### Relevant questions

- Are each of the indicators being monitored and checked at appropriate intervals?
- When checked against the performance measures/limits/targets, are the indicators suggesting there is acceptable performance? If not, why?
- If performance is not acceptable, are there predefined management actions that will occur for this issue (e.g. control rules)? If not, what are the actions that should be taken to improve performance to acceptable levels?
- Can the required changes in management arrangements be implemented without changing the formal Management Plan? If not, go back to Activities 3.3 and 4.2.
- If a major disruption or event has occurred, review the risk analysis and potentially the Management Plan (i.e. feedback to Steps 2 and/or 3).
- If there is a major change in government policies directly related to the fishery, review the entire management system (i.e. feedback to Step 1).

## Activity 4.3 Review performance of the management system

### Key actions


- Regularly review the state of the system, as measured by the indicators, against the agreed performance measures (targets and limits).
- Where performance is not acceptable, implement any predefined actions as outlined in a harvest strategy or examine what possible alternative management measures may be appropriate (feedback loop to Step 3).
- After a major disruption occurs, or some outcomes remain at unacceptably poor states, undertake a new risk analysis and review the Management Plan (feedback loop to Step 2).
- After a period defined in the plan, or a major change in overall government or community policies, undertake a new EAF planning process to review the basis of the entire Management Plan (feedback loop to Step 1).

### Tools

This activity does not require too many specific tools because it is essentially using the outputs of tools either adopted for monitoring and assessment (Activity 3.2) or those for management option evaluation (Activity 3.3) and the implementation of the operational plan (Activity 4.1).

Tools are required if the performance monitoring system needs to be refined and if harvest strategy and control rules are to be used. In this case a formal mechanism linking the indicator and performance measures with changes in the management arrangements is required. This would include pre-agreed courses of action (such as increases or decreases in catch or effort quotas, etc.) based on the indicator reaching certain levels in relation to the performance measures. In general, the less accurate the indicator, the less likely it is that precise preset harvest strategies can be used.

Where additional actions outside the scope of what is allowed in the current Management Plan are required, this will generally require going back to one of the previous steps and the tools relevant to these steps. The selection criteria for these tools are given in the table below.

 <b>Tools and information sources</b>	<b>Page</b>	<b>Selection criteria</b>					
		<b>Difficulty</b>	<b>Cost</b>	<b>Capacity</b>	<b>Know.</b>	<b>Participation</b>	<b>Time</b>
Consultation tools	50						
Social and economic assessment methods	91	Fairly Hard	L–H	M–H	M–H	M–H	M–L
Quantitative stock assessment methods	99	Fairly Hard	M–H	M–H	M–H	L	M–L
Harvest strategies and control rules	153	Moderate	M	M	M	L–M	M
Management Strategy Evaluation (MSE)	159	Very Hard	M–H	H	H	L–M	M–L
Fisheries enforcement and compliance	158	Moderate	L–H	H–M	H–M	L–M	L–M
Collecting fishery data for performance monitoring	*	Easy	L–M	L–M	L	L–H	S–M

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)

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## Activity 4.4 Reporting, communication and auditing of performance

### Overview of the activity

Good governance involves transparency to enhance the level of confidence in the process. It is therefore expected that each fishery should report on the current outcomes being generated by the management system to core stakeholders, the parliament, the public at large, and possibly at regional and world levels (e.g. UN). It is also becoming more common for the public in many countries to require some level of independent auditing of performance to be confident that acceptable community outcomes are being generated. This is resulting in the increased use of eco-labelling and other third party auditing systems.

The level and type of reporting and auditing required for each fishery will be affected by who the main audiences are. This in turn is dependent upon the type of fishery; the markets where the product is sold; local, national and international community attitudes; the types of issues involved; and any legislative requirements and relevant treaties.

Keeping stakeholders informed at a community level is very important to maintain the momentum and legitimacy of the management system and its functionality (e.g. its capacity to adapt to change) especially where this is a community based fishery. Having the government stay committed to controversial actions will generally require direct discussions with key political leaders not merely submission of reports.

For some fisheries, e.g. an export fishery or in instances where the fishery interacts with some well known iconic species, the key audience may not even be in the country where fishing takes place.





## Activity 4.4 Reporting, communication and auditing of performance

### Relevant questions

- What is the target audience of the report on fishery performance and why?
- Who needs to know about the fishery and why? Are they interested in all aspects or just some aspects of the fishery?
- What are the formats needed for each type of audience: formal report, newsletter, Web site, etc.
- What should the frequency of the reports be for each audience?
- What should the report contain: information on successes and failures; progress and blockages; problems and solutions; present state as well as future perspectives?
- What action is expected from the audience in return?
- What impact are the reports expecting to have: awareness raising? Institutional response?
- How to get feed-back on the reports?
- Is it time to consider eco-certification?
- Is the current auditing frequent enough and independent enough?

### Key actions

- Make information on the performance of the fishery available to relevant stakeholders.
- Where appropriate, have the fishery outcomes independently audited.
- Develop a communication strategy (include information on audience, purpose, means).
- Establish a process to produce some type of report, newsletter, Web site that will provide the key audiences with the types of data they require.
- Determine what model is needed for reporting to parliament (if required).
- Establish a system to obtain feed-back from stakeholders (e.g. through the Web site, or formal round-table discussions).



# Activity 4.4 Reporting, communication and auditing of performance


## Tools

At the simplest level, the performance of the fishery could be communicated to stakeholders directly, at regular meetings assisted by local extension officers, by direct contact or via traditional communication methods. Short reports (e.g. fishery bulletins) could be developed and circulated to all industry members using web pages and email and even text messages. Unexpected or serious events may call for a special effort, e.g. using radio and other media (TV, newspapers).

More important strategic reports on the performance of the fishery may need to be submitted to government, e.g. to the Parliament. The latter will certainly have a prescribed format. There are now many examples of regular and comprehensive status reports.

External audits can include independent reviews of one or more aspects of the fishery (e.g the stock assessment). In some countries the entire set of fisheries are audited by the environment agency. There is now a number of comprehensive non-government systems for external auditing done for eco-labelling/third party certification. Because of the cost of formal eco-labelling this will usually be restricted to those commercial fisheries that are relatively valuable and where markets are likely to pay a premium (or even just allow entry) for certified products. The costs of such schemes are likely to be prohibitive for most small-scale fisheries.

The selection criteria for these tools are given in the table below.

 Tools and information sources	Page	Selection criteria					
		Difficulty	Cost	Capacity	Know.	Participation	Time
Consultation tools	50						
Eco-labelling - third party certification	170	Very Hard	H	H	H	L-H	L
Newsletters	*	Easy	L-M	L-M	L	M	M
Web pages	*	Moderate	L-M	M	L	L-H	M
Status report examples	*	Moderate	L-M	M	M	L	M
Independent reviews	*	Moderate	M	H	M	L-M	M

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)  
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# Consultation tools

One of the most critical elements of EAF is that it encourages a high level of participation from all relevant stakeholders in the planning process. The tools to assist and facilitate input from stakeholders are therefore very important and are relevant to every step of the EAF process.

Consultation relevant to EAF can be largely divided into five categories:

- (1) awareness raising/ information delivery;
- (2) facilitating stakeholder input;
- (3) decision making;
- (4) team building; and, importantly
- (5) project management.

It is important to note that one consultation tool may be relevant for more than one of these categories.

If stakeholders are not accustomed to dealing with management, technical issues or planning processes they need some guidance to assist with their participation. In such cases, it is advisable to undertake awareness raising through information meetings before starting formal consultation. Where there is a high level of distrust about the process, or concerns about government intervention, (or even influence of local elites) efforts to engender sufficient trust and commitment are needed, possibly using team building tools.

Stakeholder input can be achieved through a variety of means including community meetings, formal stakeholder workshops and focused discussions using EAF presentation materials. Even individual discussions where representatives of the various groups are able to participate may be useful. The consultation methods and tools often work best in combinations. For example, a small group can draft a set of identified issues with a broader workshop forum undertaken to ensure all perspectives and views have been identified.

While a small, knowledgeable group of experts may be able to provide comprehensive input, this may not generate broad acceptance of the outcome compared to a more inclusive process. Stakeholders often want input to the process, even where their technical understanding may be limited, to ensure that their concerns are heard and their local knowledge and perceptions are taken into account.


Determining the right level of consultation to assist with decision making (especially those made by consensus) is not as simple as it is when consultation is used to obtain opinions but no decision is made (e.g. the identification of issues). When using highly technical methods, only a small number of individuals will be directly involved, whereas surveys will automatically include many individuals. Depending upon the specific issue, the consultation method can therefore range from a single expert providing advice, to input obtained from the entire stakeholder community. Choose the method that will give you the right level of input, ownership combined with robustness and rigor in the outcome.

Consultation processes involving group input will depend greatly upon the skills of whoever is facilitating the meeting/workshop. There are a number of online descriptions and tips for being a facilitator but facilitation and consensus building courses are common.

Project meetings are a very important consultation activity. While they only directly involve the project team, they are extremely important to ensure that the planning process stays on track. Any resolutions/outcomes can be distributed more widely to enable other groups to be kept informed of progress.

# Consultation tools – continued

The selection criteria for these tools are given in the table below.

 <b>EAF Tools and information sources</b>	Page	Selection criteria					
		Difficulty	Cost	Capacity	Know.	Participation	Time
Stakeholder workshops	51	Moderate	M–H	M–H	L	M–H	M
Questionnaires	55	Hard	H	M–H	L	M	M–L
Facilitation- online descriptions	57	Easy	L	L	L	M	S
Conflict management, negotiation and consensus building	60	Moderate	L–H	M–H	L	M–H	S–L
Project meetings	*	Easy	L–M	L–M	L	M–H	S
Community and stakeholder meetings	*	Easy	L–M	L–M	L	M–H	S–M
EAF presentation materials	*	Easy	L	M	L	M	S
Focused conversation	*	Moderate	M	M	L	M	M
Consensus workshop method	*	Moderate	M–H	L	M–H	M–H	S–M
Team building methods	*	Moderate	L–H	M	L	M–H	M
Facilitation courses	*	Moderate	M–H	L	L	M	M

\* Detailed tools fact sheet available at [www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)  
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# Stakeholder workshops

**EAF steps**   **Step 1 - Initiation and scope**  
**Step 2 - Identification of assets, issues and priority**  
**Step 3 - Development of management systems**  
**Step 4 - Implementation, monitoring and performance review**

## Purpose

To provide an appropriate forum for the identification, discussion and resolution of issues using input from multiple stakeholders or groups. These types of forums may be necessary for completing a number of different activities and steps during the EAF planning process.

## Overview

Implementing the EAF planning process can often require questioning, and potentially changing, embedded social institutions that relate to how the fishery is governed, the attitudes that are held by the participants and other stakeholders and the way we use and integrate scientific understanding into political decision making. Generally governments cannot readily bring about such change without stakeholder input. The most viable option is therefore to work out how other parts of society can work together with government in a partnership arrangement for the benefit of fishers. Holding stakeholder workshops is a very good way to initiate or contribute to the formation of partnership approaches.

A stakeholder workshop involves a meeting of multiple stakeholders to:

- involve these stakeholders in improving situations that affect them.
- form a useful social interaction that enables different individuals and groups, who are affected by an issue or initiative, to enter into dialogue, negotiate, learn, make decisions for collective action.
- get government staff, policy makers, community representatives, scientists, business people and NGO representatives to think and work better together.

Workshops can combine training, development, team-building, communication, motivation and planning and usually have a clear purpose or output that is to be generated through the workshop process rather than just being an awareness raising exercise. Participation and involvement in workshops increases the sense of ownership and empowerment, and facilitates the development of the organizations and individuals involved. Workshops are effective in helping to manage or facilitate change, achieving improvements and particularly the creation of initiatives, plans, processes and actions to achieve aims. They are also good for breaking down barriers, improving communications inside and outside of agencies, groups and communities.



# Stakeholder workshops – *continued*

## **EAF tool tips**

The complex and difficult social problems that are identified by the EAF process may require innovative solutions which are best created when diverse stakeholders are able to meet, share experiences, learn together and contribute to decisions. Moreover, the ultimate success of any potential way forward lies in developing the collective commitment and capacity to turn ideas and plans into action by all stakeholder groups. This can be achieved by facilitating workshops that involve multiple stakeholder groups, which is essentially a form of social learning.

The workshop venue and the set up of the room should be conducive to good discussions. If it is in a lecture style room this will reduce input. Try and have a circular or U-shaped design and try not to have all the different groups sit together – mix them up so that they interact.

Have the venue close to where people are staying to avoid lost time in getting people to the workshop on time.

If there are more than 15 people, have breakout sessions to try and get more input from those who will not talk in bigger groups. This is especially relevant if one or two people have a tendency to dominate the discussions.

Workshops can be intensive and tiring. Don't forget to give participants regular comfort breaks to stretch their legs, have a drink or get some fresh air.

The main steps to running a good workshop are:

1. Determining who should be at the workshop.
2. Ensure a suitable date is set (there are a number of specific tools to assist in setting dates, see below).
3. Send out an agenda or topic or background material early enough for comments and for participants to have read the material.
4. Use a suitable venue that has all the equipment needed and is close to where participants are staying.
5. At the opening of the workshop, explain the background and context for the workshop, and the intended outcomes.
6. Get participants to introduce themselves and, if appropriate, conduct some sort of ice breaker that establishes rapport between participants and generates a few laughs.
7. Explain the agenda and process of the workshop and the role of the facilitator.
8. Invite participants or representatives to make a statement about what they would like to see achieved by the workshop.
9. Run the series of activities that will enable the objectives of the workshop to be achieved (there are many specific EAF based consultation tools to assist with this).
10. Clarify the outcomes of the workshop and agree on future actions.
11. Ask participants to provide an evaluation of the workshop (optional).
12. Close the workshop by inviting participants to say what the workshop has meant for them.
13. Write up the workshop and provide a report to participants as soon as possible.

# Stakeholder workshops – *continued*



When you are holding a stakeholder workshop it is important that it is run effectively and efficiently. Below are some universal tips to help any workshop run more smoothly.

- Prior to the workshop, identify and agree on the aim of the workshop. You can invite suggestions from stakeholders if appropriate. This can sometimes maximize commitment and empowerment.
- Make sure you think through the structure of the workshop and have all the materials ready before you start.
- Consider carefully whom to invite to the workshop. Try to get as many of the right people as possible in the same room. Determine who needs to attend the meeting. This can include those who are essential (if they can't attend the workshop should not proceed), those who should attend but are not critical, and others who are essentially optional. A stakeholder analysis may be needed to determine who is needed.
- Set a suitable date and venue for the meeting and issue an agenda. Is there any background information you can send participants before they come to the workshop? This is a good time to send it.
- The agenda should define the purpose of the meeting. List the agenda items and time allotments, and include any reference materials that should be reviewed prior to the meeting.
- Have the agenda and meeting goals on a blackboard or flipchart in the meeting room. This will help keep the team members focused on the tasks at hand. Follow the agenda, start on time and end on time.
- Think about the atmosphere and group dynamic you want to set with your participants. Are you looking for a straightforward, businesslike and direct approach? Or will your participants feel more at ease in a creative, relaxed and fun atmosphere?
- Make sure you have a range of materials to use during the session. Put together flip charts, notebooks, sticky notes, coloured markers, sticky tape, pens and pencils for the stakeholders to use.
- Your meeting should have a facilitator, either the meeting leader or another designated individual. The role of the facilitator is to keep the discussion focused on the topic, stay on the agenda, and stay on time. The facilitator controls the meeting by establishing time limits, listing specific agenda items, defining the purpose of the meeting, and controlling the discussions.
- Make introductions, have team members introduce themselves and tell where they work or what they do.
- Use a warm-up activity, sometimes called an icebreaker. This activity serves two purposes: i) it promotes participation and communication; and ii) it encourages stakeholder team building.
- Have the team members develop and agree upon meeting ground rules. These agreements establish norms for participant behaviour and define how the meeting will be conducted.
- Encourage participation from all stakeholders – ensure that no one person or group dominates the discussion.
- If decisions are to be made, determine how this will take place. There are a number of methods to make decisions ranging from voting to building consensus. A majority vote decision method requires support from more than 50 percent of the members of the group and can be accomplished through voting, either by a show of hands or written secret ballot. One method is to use the “sticky dot” approach (see non-formal prioritisation method fact sheet for more details).



# Stakeholder workshops – *continued*

- Keep the discussion focused on the agenda items to avoid investing time where team members discuss items that are extraneous to the agenda. The comments may be interesting, but they are likely to detract from the meeting's goals.
- Park issues that are important, but unrelated to the specific agenda in a “Parking Lot” by recording them on the flipchart or blackboard for future consideration or agendas.
- Prior to adjourning the meeting summarize the results and conclusions from the meeting; record any actions or assignments, who is responsible to complete them, and a timeline for each action.

Use a check-out to end the meeting. A check-out is an opportunity for stakeholders to share their thoughts on how the meeting went, what worked well and what could be done to improve future meetings.

## Source of information

### Workshop tips

The following Web site has a number of tools and descriptions that can be used in workshops: <http://portals.wi.wur.nl/msp>

### Date planning tools

With all the different calendars making appointments to organize people to attend a workshop can often be a huge task. There are web tools that make the process a lot easier. Someone chooses a number of suitable dates, and stakeholders can indicate which dates suit them:

Meeting planner: [www.meetingwizard.com](http://www.meetingwizard.com)

Event planner: [www.datumprikker.nl](http://www.datumprikker.nl)

Doodle: [www.doodle.ch](http://www.doodle.ch)



# Questionnaires



**EAF steps**   **Step 1 - Initiation and scope**  
**Step 2 - Identification of assets, issues and priority**  
**Step 3 - Development of management systems**  
**Step 4 - Implementation, monitoring and performance review**

## **Purpose**

Provide a structured basis for gathering information on a wide range of issues from a potentially large or dispersed group of stakeholders.

## **Overview**

### **General description**

Well structured questionnaires can provide useful information on a variety of issues. They have advantages over some other types of surveys in that they can be relatively cheap (they do not require as much effort from the questioner as is needed for a verbal or telephone survey) and usually have standardized answers for questions that make it simpler to compile data.

However, standardized answers may frustrate users and questionnaires are also sharply limited by the fact that respondents must be able to read the questions and respond to them. Thus, for some stakeholder groups, conducting a survey by using a questionnaire may not be practical or appropriate.

Usually, a questionnaire consists of a number of questions that the respondent has to answer in a set format with a distinction made between open-ended and closed-ended questions. An open-ended question asks the respondent to formulate his own answer, whereas a closed-ended question has the respondent pick an answer from a given number of options. The response options for a closed-ended question should be exhaustive and mutually exclusive. A respondent's answer to an open-ended question is usually coded into a response scale or into a category afterwards.

The questionnaire can be filled out in a face-to-face meeting where an interviewer presents the items orally; the questionnaire is filled in directly by the person being interviewed either on paper, or increasingly nowadays, online where the items are presented on the computer screen, often via the web.

### **Specific questionnaire for fisheries management and the code of conduct**

The FAO has developed a specific questionnaire for management agencies to use to determine how well their management systems are compliant with the FAO Code of Conduct for Responsible Fisheries (Caddy, Reynolds and Tegelskär Greig, 2007). This could be a valuable exercise for an agency to undertake prior to beginning the EAF planning process, because it is likely that this will identify where there are deficiencies or problems. This analysis can be the basis for developing the issue identification for the governance components of EAF in Step 2.



# Questionnaires – continued

## EAF tool tips

Use statements which are interpreted in the same way by members of different sub-populations of the population of interest.

- Use statements so that persons who have different opinions or traits will give different answers.
- Think of having an “open” answer category after a list of possible answers.
- Use only one aspect of the construct you are interested in per item.
- Use positive statements and avoid negatives or double negatives.
- Do not make assumptions about the respondent.
- Use clear and comprehensive wording, easily understood by all education levels.
- Use correct spelling, grammar and punctuation.
- Avoid items that contain more than one question per item (e.g. Do you like strawberries and potatoes?).

## Source of information

### Tips on design:

Frery, R.P. 1996. *Hints for designing effective questionnaires*. ERIC/AE digest series EDO-TM-96-08. (Available at <http://ericae.net/digests/tm9608.htm>).

StatPac. 2012. *Survey design tutorial. Designing surveys and questionnaires*. Accessed 24 September 2012. [www.statpac.com/surveys/](http://www.statpac.com/surveys/)

### Specific questionnaires for EAF:

Caddy, J.F.; Reynolds, J.E. (ed.) & Tegelskär Greig, G. (ed.). 2007. *Using questionnaires based on the Code of Conduct for Responsible Fisheries as diagnostic tools in support of fisheries management*. FAO FishCode review. No. 21. Rome, FAO. 129 pp. (Available at [www.fao.org/docrep/010/a1449e/a1449e00.htm](http://www.fao.org/docrep/010/a1449e/a1449e00.htm)).

### Other relevant references

Foddy, W.H. 1994. *Constructing questions for interviews and questionnaires: theory and practice in social research* (New ed.). Cambridge, UK. Cambridge University Press.

Gillham, B. 2008. *Developing a questionnaire* (2nd ed.). London, UK. Continuum International Publishing Group Ltd.



# Facilitation – online descriptions

**EAF steps** Step 1 - Initiation and scope  
Step 2 - Identification of assets, issues and priority  
Step 3 - Development of management systems  
Step 4 - Implementation, monitoring and performance review

## Purpose

Group facilitation plays a critical part in getting people to contribute to the identification of issues and the resolution of problems, or generating solutions which are critical parts of all the steps in the EAF planning process. It is used in all parts of the EAF process, such as a group of resource users, fishery and coastal managers, interests from outside the fisheries sector and environmental NGOs trying to decide upon management or policy objectives at a national workshop.

The facilitator is responsible for ensuring the group (big or small) works in a cohesive manner to reach a workable solution as quickly as possible. Improving facilitation skills will assist in the efficient and effective running of these meetings and workshops and should generate better overall outcomes.

## Overview

The Web sites listed below all have extensive material on facilitation and how this can be improved. A summary synthesis of some of this information is provided below and could be used as a quick starting point.

## EAF tool tips

Good facilitation is extremely valuable for the EAF process. It is so easy for meetings to get lost in unnecessary detail or to have individuals hijack the process for their own purposes. The facilitator should not be a subject matter expert (which is different to being a process expert) who is critical to the outcome. Subject matter experts can dominate the discussion and drive the meeting to their own solution but also they will not have enough “brain space” to think about their contribution to the subject matter, and how to keep the meeting progressing towards a conclusion.

It is often important to have a trained facilitator, who:

- Distinguishes process from content
- Manages the client relationship
- Prepares thoroughly for planning
- Uses time and space intentionally
- Evokes participation and creativity
- Maintains objectivity at all times
- Reads underlying group dynamics
- Releases blocks to the process
- Adapts to the changing situation
- Shares responsibility for process
- Demonstrates professionalism
- Shows confidence and authenticity
- Maintains personal integrity

# Facilitation – online descriptions – *continued*

## Summary of tips to improve facilitation skills.

### Preparation

- Ensure there is a suitable venue available, not too big or too small.
- Materials such as a whiteboard, computer projector and paper should be available.
- The appropriate people need to be invited.
- In discussion with key participants, work through scenarios that may arise, and develop contingency plans. For example, is someone going to talk over everyone else? Is there a hidden agenda? Are there personality conflicts in the group? Does the facilitator need to discuss behaviour with individuals?
- The rules of the meeting need to be established. Is the meeting to start on time if everyone is not there? How long should topics be discussed before they are taken out of the meeting? Who is taking minutes? If there is an impasse, how will it be resolved? By vote? By escalation?

### Introduction to participants

- The facilitator should start the meeting by stating the purpose, the process, and the expected outcome. They should cover the timeframe and the key issues to be addressed.
- An agenda should have been developed and distributed in advance and this should be confirmed or amended.
- Have very clear instructions and focus for each session.
- Keep it as simple as possible.
- Be very time conscious; don't be over ambitious about what can be achieved.

### Group interactivity

- The facilitator should ensure as far as possible, everyone is starting with a common level of understanding. Just because a document was circulated in advance, does not mean it has been read. The meeting should start by bringing everyone up to speed.
- The facilitator should also ensure there is no dissention about the background, or that important information has not been shared. This may require a briefing from someone at the start of the meeting.
- Use activities to create an atmosphere that breaks down barriers between people and reduces the feeling of threat.
- It is important that the facilitator maintains equality. Nobody should be allowed to dominate the meeting. Equally, nobody should be sitting quietly in a corner. The facilitator should ensure everyone has a chance to contribute. The order in which contributions are made can also influence the meeting so the facilitator should be cognisant of the pecking order and ensure "follow the leader" is not the name of the game. Try to have the opinion leaders hold their views back until others have been encouraged to take a stand.
- The facilitator should test the views by posing a contrary view. If nobody disagrees, it may be because nobody is thinking it through, or is grasping the obvious solution. If the facilitator plays devil's advocate, it can often lead to a better result.
- Sometimes, issues that are controversial are buried. As the independent voice, the facilitator needs to drag out the issues nobody wants to talk about – the elephant in the room syndrome.
- Alternate between small groups and plenary sessions, but don't overdo it.
- Build a common language.

# Facilitation – online descriptions – *continued*

## Recording

- Record all material on flipchart paper and stick finished sheets to the walls.
- Unless it is a small meeting or dot points are used, the facilitator cannot do this and record notes as well.
- Have helpers to write up discussions in detail.
- Write up the workshop as soon as possible.

## Involving others in facilitation

- When working with larger groups, use assistant facilitators who are trained in the techniques being used and well prepared for their role.
- Delegate roles and responsibilities.

## Dealing with frustrations and concerns

- It is often useful, if someone is struggling to communicate a point, for the facilitator to crystallise what is being said. “If I understand what you are saying, we need to go from A to B via C. Is that right?” This will focus the person talking, as well as the meeting.
- By being responsive to people’s concerns or frustrations when conflict arises, the facilitator can keep the views away from direct confrontation. They can elicit opinions from conflicting points of view in a rational manner and work through a resolution.
- Give people time to relax and unwind.
- Frustration and conflict are healthy parts of a workshop, learn how to manage them and don’t be frightened.
- Take risks with workshops and don’t worry too much about getting it perfect. People like to talk together and share their ideas; if they have had this opportunity, the chances are they will have found the workshop worthwhile.

## Summarising

- The facilitator needs to be able to collect the outcome as it evolves and feed it back to the group at the end of the meeting.
- They need to state the decisions reached, and actions to follow. Ideally, as the independent party, they should prepare the minutes.
- They also need to confirm with the participants what actions are to be taken, who is responsible, and due dates for the actions to be completed.

## Source of information

Basic facilitation skills: [www.uiowa.edu/~cqi/2002BasicFacilitationPrimer.pdf](http://www.uiowa.edu/~cqi/2002BasicFacilitationPrimer.pdf)

Clarke, S.; Blackman, R. & Carter, I. 2004. *Facilitation skills workbook: training material for people facilitating small group discussions and activities using PILLARS Guides*. Tearfund. 80 pp. (Available at [http://tilz.tearfund.org/webdocs/Tilz/Fac%20skills%20English/Facilitation%20\\_E.pdf](http://tilz.tearfund.org/webdocs/Tilz/Fac%20skills%20English/Facilitation%20_E.pdf)).

Facilitation skills portal: [www.skillsportal.co.za](http://www.skillsportal.co.za)

Facilitation tools and techniques: <http://learningforsustainability.net/tools/facilitation.php>

Pacelli, L. 2009. *Ten tips to boost your facilitation skills*. Executive brief. (Available at [www.executivebrief.com/blogs/10-tips-to-boost-your-facilitation-skills/](http://www.executivebrief.com/blogs/10-tips-to-boost-your-facilitation-skills/)).





# Conflict management, negotiation and consensus building

**EAF steps**

- Step 1 - Initiation and scope**
- Step 2 - Identification of assets, issues and priority**
- Step 3 - Development of management systems**
- Step 4 - Implementation, monitoring and performance review**

## Purpose

The goal of conflict management is not to avoid conflict, but to apply skills that can help people to express their differences and solve their problems for “win-win”, or mutually beneficial, outcomes.

Closely related to conflict management, consensus building is the term used for a number of collaborative decision-making techniques in which a facilitator or mediator assists diverse or competing interest groups to agree on contentious policy issues, management objectives, or other matters for which consensus rather than majority decisions is being pursued.

These tools are useful at many points in policy and planning cycles, and management as well, to reduce the actual or potential levels of conflict amongst diverse stakeholders so that decision processes can be more positive and productive.

## Overview

Given the valuable resources and high levels of human activity that characterise coastal areas, there are inevitably competing and conflicting claims over the allocation and use of such resources. The resolution of conflict is one of the central concerns of any legal system and courts may have an important part to play in resolving disputes in coastal areas. However, traditional “top-down” legislative processes and litigation through the courts have often proved to be ineffective methods of regulating competing interests and addressing conflicts concerning natural resources and the environment.

Dissatisfaction with conventional litigation and rule-making processes has led to a growing trend in favour of alternative dispute resolution (ADR) techniques in the context of natural resources and environmental management. These techniques include arbitration, mediation and direct negotiation, and alternative means of regulating to avoid or manage conflict, such as negotiated rule-making. Since these techniques aim to engage the disputants actively in seeking a result acceptable to all the parties involved, they are likely to be more effective in the coastal context.

## Conflict resolution

Being social interactions, conflicts have many dimensions that should be properly understood before interventions are made. Often there will be more than one source of conflict. Correct identification of the nature of the source of the conflict requires getting past the symptoms until the root cause(s) are reached. Potential sources of conflict include:

- Relationships – values, beliefs, prejudices, past injustices, poor communication.
- Information – poor quality information, misinformation, differing interpretations.
- Interests – perceived or actual, substantive/physical or intangible/perceptual.
- Structures – institutions, authority, resource flows, time constraints, financing.

There are several stages in conflict management and negotiation. The following apply to most methods:

- Initiation – a stakeholder or outsider invites help to manage the conflict.
- Preparation – conflict analysis, information sharing, rules, participant selection.
- Negotiation – articulating interests and win-win options, packaging desired options.
- Agreement – concluding jointly on best option package, recording final decisions.
- Implementation – publicising outcomes, signed agreement (optional).

# Conflict management, negotiation and consensus building – *continued*

## Consensus building

Consensus is a decision making process that works creatively to include all persons making the decision. It is the most powerful decision process because all members agree to the final decision and all participants have a direct voice and veto power. In short, consensus takes into account and validates each participant and everyone gets the opportunity to voice their opinion, or block a proposal if they feel strongly enough about a decision.

A consensus means overwhelming agreement, which is not the same as unanimous. It is important that consensus be the product of a good-faith effort to meet the interests of all stakeholders. The key indicator of whether or not a consensus has been reached is that **everyone agrees they can live with the final proposal**. This, therefore, also differs from a majority-rule decision which, rather than focusing on producing the best possible outcome for everyone, almost guarantees an unhappy minority and instability, with the minority biding their time, awaiting an opportunity to sabotage the group's outcome.

Most dispute resolution professionals believe that groups or assemblies should seek unanimity, but settle for overwhelming agreement that goes as far as possible toward meeting the interests of all stakeholders. It is absolutely crucial that this definition of success be clear at the outset. Before the parties in a consensus building process come together, mediators (or facilitators) can play an important part in helping to identify the right participants, assist them in setting an agenda and clarifying the ground rules by which they will operate, and even in "selling" recalcitrant parties on the value of participating. Once the process has begun, mediators (facilitators) try to assist the parties in their efforts to generate a creative resolution of differences. During these discussions or negotiations, a mediator may accompany a representative back to a meeting with his or her constituents to explain what has been happening.

The mediator might serve as a spokesperson for the process if the media are following the story. A mediator might (with the parties' concurrence) push them to accept an accord (because they need someone to blame for forcing them to back-off the unreasonable demands they made at the outset).

Finally, the mediator may be called upon to monitor implementation of an agreement and re-assemble the parties to review progress, or deal with perceived violations or a failure to live up to commitments.

## EAF tool tips

In EAF, consensus building is especially important at the levels of policy goals and plan objectives where reaching harmonious agreement on big issues paves the way for subsidiary agreements on numerous smaller technical and institutional issues. For example, an agreement on how agricultural and fisheries development should mesh with tourism may set the stage for comprehensive watershed and coastal management encompassing both terrestrial and aquatic ecosystems. Without consensus at a higher policy level on how these economic sectors are either related or integrated, using and interpreting sectoral performance indicators could be difficult.

In the highly technical situations common in EAF negotiations, there may be serious disparities in the capacity of stakeholder groups to interpret and use the information provided. In such situations it may be necessary, as part of the process, to allocate specialist expertise to groups in need. Mutually beneficial outcomes can usually only be realised if participants progress from negotiating on the basis of positions to negotiating in keeping with their underlying interests.

# Conflict management, negotiation and consensus building – continued

## Some guidelines for reaching consensus

1. **Present your position as lucidly and logically as possible**, but listen to other members' reactions and consider them carefully before you press your point. Avoid arguing solely for your own ideas.
2. **Do not assume that someone must win and someone must lose** when discussion reaches stalemate. Instead, look for the next-most-acceptable alternative for all parties.
3. **Distinguish between major objections and discomfiture or amendments.** A major objection is a fundamental disagreement with the core of the proposal.
4. **Do not change your mind simply to avoid conflict and to reach agreement and harmony.** When agreement seems to come too quickly and easily, be suspicious, explore the reasons and be sure that everyone accepts the solution for basically similar or complementary reasons. Yield only to the positions that have objective and logically sound foundations.
5. **Avoid conflict-reducing techniques such as majority vote, averages, and bargaining.** When a dissenting member finally agrees, don't feel that s/he must be rewarded by having his/her own way on some later point.
6. **Differences of opinion are natural and expected. Seek them out and try to involve everyone in the decision process.** Disagreements can help the group's decision because, with a wide range of information and opinions, there is a greater chance the group will hit on more adequate solutions. **Decision making through consensus involves discussion and accountability of view points** as opposed to power struggles. Postponement of decisions to give time to reconsider and recognize that all people participating are able to accept and work with the decision is vital to the consensus process.
7. **Remember that the ideal behind consensus is empowering versus overpowering,** agreement versus majorities/minorities. The process of consensus is what you put into it as an individual and a part of the group.
8. **Finally, use your minds - you've got good ones or you wouldn't be here.** So think before you speak; listen before you object. Through participating in the consensus process, one can gain insight not only into others but also oneself.

## Source of information

A short guide to consensus building: [http://web.mit.edu/publicdisputes/practice/cbh\\_ch1.html](http://web.mit.edu/publicdisputes/practice/cbh_ch1.html)

Consensus Building Institute: <http://cbuilding.org>

Consensus: How to and why: [www.msu.edu/~corcora5/org/consensus.html?pagewanted=all#guide](http://www.msu.edu/~corcora5/org/consensus.html?pagewanted=all#guide)

Fisher, R. & Vry, W. 1983. *Getting to yes: negotiating agreement without giving in*. Penguin Books. New York. 240 p.

Scialabba, N. (ed.). 1998. *Integrated coastal area management and agriculture, forestry and fisheries*. FAO Guidelines. Environment and natural resources service. Rome, FAO. 256 pp. (Available at [www.fao.org/docrep/W8440E/W8440E00.htm](http://www.fao.org/docrep/W8440E/W8440E00.htm)).



# Description for completing an EAF Baseline Report

## EAF steps

### Activity 1.1 - Initial process planning and determining stakeholder support

#### Purpose

Generate an EAF baseline document that outlines the available information on the fishery that can assist with the rest of the EAF management planning process.

#### Overview

The EAF baseline (EAF-BL) report is an agreed baseline for the fishery completed before introducing EAF in the management of the resource in question. It should be a reference material for EAF planning and should provide reference points for monitoring and evaluation of EAF activities and management actions.

#### EAF tool tips

Preparation of the EAF-BL report should be led by national and regional experts using the guidelines provided here.

#### EAF Tool - Baseline Report headings

This fact sheet provides guidance on key information to be collected as background to the EAF planning steps and activities.

Each EAF-BL should contain information on the following:

1. Is there a management plan for the fishery?
2. Where there is no management plan, are there stated or *de facto* objectives for the fishery?
3. What is the legal framework within which the fishery is operating?
4. What are the institutional and administrative frameworks for fisheries management in the country?
5. Overview of the fishery and resources exploited.<sup>1</sup>
  - 5.1 Details of fishing gear used and areas fished.
  - 5.2 Give brief information on the resources exploited.
  - 5.3 Number of fishers and land-based workers by sector. Indicate full-time and part-time.
  - 5.4 Provide information on direct interactions with other fisheries, e.g. competing for same target species; target species taken as bycatch in another fishery; bycatch in this fishery.

<sup>1</sup> Where a major fishery type includes different fleets or sectors (for example the bottom trawl, set nets and handline sectors of a demersal fishery) it will be necessary to provide the relevant information for each sector, as well as any pertinent information for the fishery as a whole.



# Description for completing an EAF Baseline Report – *continued*

6. Available scientific and traditional knowledge on the resources.
  - 6.1 Brief biology of the major fish species.
  - 6.2 Geographical distribution of the species.
  - 6.3 Estimated status of the stocks (especially over the last five years).
  - 6.4 Provide information on any direct interactions with the ecosystem (impact on sea bottom; pollution caused by the fishery; effects of coastal zone development or land-based pollution, etc.).
  - 6.5 Summarise the traditional knowledge about the fishery and the resources exploited.
7. Annual catches from the earliest time available (by species or lowest available taxonomic group where landings are multispecies).
8. Assessment of the importance of the fishery to the national economy.
  - 8.1 Value of the catches from the fishery per year for the last five years (by species or lowest available taxonomic group where landings are multispecies). Also add time series of market prices for the landings.
  - 8.2 Value of products and markets and an assessment of the numbers of jobs created in value-added industries linked to the sector.
9. Full set of management measures/primary management tools currently being used in the fishery/sector including those indicated in the table below.
10. From the table below, assess the effectiveness of the current management measures in relation to the fishery itself, including effectiveness in ensuring sustainable utilisation. “Effectiveness” may be in terms of better status of the stocks (increasing CPUE), decreasing conflicts, increasing value, level of compliance, etc.
11. Any compliance or enforcement problems being experienced in the fishery, and any complaints or dissatisfaction among fishers/rights holders. You need to consider scientific monitoring (e.g. of catches against permitted exploitation) as well as MCS (monitoring, control and surveillance).
12. Is there a co-management, or a national or regional forum for discussions on management of this or other resources?  
If yes, give a short description of the forum (nature, frequency, subject of discussions, outcomes, etc.).
13. Any other comments relevant to the current governance\* of the fishery and the way forward for the introduction of EAF.

## Source of information

EAF-Nansen project. (Available at [www.eaf-nansen.org/](http://www.eaf-nansen.org/)).

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\* Governance is defined here as the sum total of the legal, social, economic and political arrangements used to manage fisheries.

# Description for completing an EAF Baseline Report – continued



**Table** Please indicate use with a “✓” and comment on the status of implementation.

Type of management tool	Tick ✓	Comments (e.g. when introduced, effectiveness, compliance, etc.)
<b>Spatial (area) restrictions and closures</b> such as:		
Marine protected areas where fishing is prohibited		
Nursery area closures		
Marine reserves where fishing is sometimes allowed		
Other temporary area closures for specific purpose (e.g. spawning aggregations)		
<b>Temporal restrictions</b> such as:		
Defined fishing season(s)		
Defined number of days fishing		
Defined number of hours per day fishing		
Defined number of hours fishing		
<b>Gear restrictions</b> such as:		
Engine size restrictions		
Gear size restrictions		
Gear type restrictions		
<b>Size/age restrictions</b> (i.e. minimum or maximum sizes)		
<b>Participatory restrictions</b> such as:		
Licences		
Limited entry		
<b>Catch restrictions</b> such as:		
Total allowable catch (TAC) limits		
Vessel catch limits		
Individual vessel quotas		
<b>Rights/incentive-adjusting regulations</b> such as:		
Individual effort quotas		
Individual fishing quotas		
Individual transferable quotas		
Individual transferable share quotas		
Group fishing rights (including community development quotas)		
Territorial use rights		
Stock use rights		



# EAF roadmap template

## EAF steps

### Activity 1.1 - Initial process planning and determining stakeholder support

#### Purpose

The EAF roadmap template is designed to assist in clearly outlining who is to be involved in each part of the EAF planning process, which tools have been selected for use in each of the activities and what are the timelines and anticipated costs for completing each of these. This should make it easier to see if the process will be feasible and provide the basis for a timetable of actions.

#### Overview

Each of the main actions required to complete the steps in the EAF planning process has been listed in a matrix (roadmap template) shown below.

The other columns in the matrix are there to document the critical elements that will be needed to complete each of these planning steps.

- Who needs to be involved? List each of the relevant agencies or groups that may be needed. In many cases it will be more valuable to identify which specific individual or positions within an agency or a group will be needed.
- Some of the groups or individuals may not always be needed for each of the steps.
- What consultation method will be used? Most (but not all) of these activities involve some consultation, even if this is just internal. If meetings or workshops are chosen, these need to be organized and have invitations sent out, rooms booked, facilitators hired or identified, etc.
- What tools will be used? You can record which tools you have chosen to use for the steps, either from the Toolbox or elsewhere to help complete the activity.
- What is the timeline? How long will it take to complete the action and when is it likely to be completed? This is important when the outcome of one action is required to start or complete another action. Where the action involves a meeting, allow sufficient time for participants to be informed of both the date and purpose, but especially if they are expected to consult with others before the meeting.
- What financial resources will be needed? Each of the actions will require resources not only in terms of people's time, but also in terms of dollars to hire rooms for meetings, and to train or hire facilitators, etc. This should be a fair estimate of what the different actions will each cost so the total can be calculated, but it will also indicate which specific actions are the most costly.

This information will greatly assist any decision making on whether to proceed with the plan or not.

# EAF roadmap template – continued

## Roadmap template

Step	Description of activity or outcome	Who will lead and be responsible for completion?	Who else needs to be involved?	Consultation method (if any)	What tool(s) will be used?	What is the timeline to complete	What finance or other resources are needed?
1.1	Internal discussions within proposing agency on the readiness and benefits of undertaking the EAF planning process.						
	Draft a description of the fishery (EAF Baseline Report), the resources available and who needs to be involved, plus terms of reference for internal planning team and identify the project champion.						
	Introductory consultation with key stakeholders.						
	Look for major risks and blockages and obtain formal endorsement.						
	Finalise the roadmap and communicate to stakeholders and likely participants.						
1.2	Determine fishery scope and clarify who has legislative control (including institutional analysis).						
	Generate agreed key values and outcomes.						
1.3	Finish collation of relevant information on fishery and draft an EAF scoping document.						
2.1	Identify and sort all relevant EAF issues for the fishery and their associated high level fishery management objectives.						
2.2	Individually assess the specific risk and/or relative priority for each identified issue.						
2.3	Consolidate issues according to, e.g. common root causes or possible management action.						



# EAF roadmap template – continued

Step	Description of activity or outcome	Who will lead and be responsible for completion?	Who else needs to be involved?	Consultation method (if any)	What tool(s) will be used?	What is the timeline to complete	What finance or other resources are needed?
3.1	Development of a set of clear and appropriate operational objectives covering each of the issues that require direct management.						
3.2	Identification of one or more indicators and their associated performance measures that can be used to monitor the performance of each operational objective.						
3.3	Selection of the most cost effective set of management arrangements designed to generate acceptable levels of performance for all operational objectives.						
4.1	Create a detailed operational (implementation) plan.						
	Based on operational plan reassess if the agreed management plan is feasible with the current resources available - if not then you will need to return to step 3.3.						
	Validate the plan with stakeholders and develop communication plans to inform all relevant stakeholders of what actions will be occurring and when. Agree on time scales for review of each major element.						
4.2	Formal adoption of the EAF based management plan.						
	Communicate outcomes of the approval process to stakeholders.						
4.3	Regular reports on level of activities completed to execute the operational plan.						
	Periodic reports on the performance of the entire management system in generating acceptable performance for each of the operational objectives and overall community outcomes.						

## Source of information

Fletcher, W.J. 2010. *Planning processes for the management of the tuna fisheries of the western and central Pacific region using an ecosystem approach*. Forum Fisheries Agency, Honiara, Solomon Islands. Facilitator's Version 6.1. (Available at [www.fisheries-esd.com/a/pdf/eafm%20based%20guide%20for%20tmp%20development%20v6%201.pdf](http://www.fisheries-esd.com/a/pdf/eafm%20based%20guide%20for%20tmp%20development%20v6%201.pdf)).



# Stakeholder analysis

## EAF steps

### Activity 1.1 - Initial process planning and determining stakeholder support

#### Purpose

Stakeholder analysis helps to systematically determine who really needs to be involved in the EAF planning process, and whose interests may be too far removed to make this a necessity. This process should also examine power, conflict, relative incentives and other relationships between stakeholders. It is related to institutional analysis, but places far more emphasis on individual motivation and/or collective interest of the individuals/groups than on institutional structures and procedures.

#### Overview

For the purpose of EAF planning, stakeholders are all those who have an interest in the issues being addressed in terms of either their welfare or utility. Some stakeholders are active - they affect the system; some are passive - they are affected by it.

#### They may be considered in detail because of their:

- importance - as possible beneficiaries of development;
- influence - their power over the success of project;
- or because they can be identified as winners or losers in the fishery management planning process.

#### Stakeholder analysis seeks to:

- identify, assess and compare their sets of interest;
- examine inherent conflicts and/or compatibilities, and
- describe and explore trade-offs.

The concept of the stakeholder therefore extends beyond merely those directly involved in the exploitation of the fisheries resource. It includes all those deriving some form of benefit from the resource or the region/community in which it is found. In the case of marine resources, this can include fishers, all those involved in the processing and sale of fish, fish consumers, tourists in the area, transport operators and their passengers, industries using water or polluting it, and any other groups or individuals with more marginal interests.

For those groups identified as having significant interests or deriving important benefits from the fishery, sociological analyses could look at their priorities and motivations, decision-making processes and institutions, and understand the social, economic and cultural links between each group and the resource.

# Stakeholder analysis – *continued*

At the level of the household, other issues, including the role of women, their degree of mobility and the stage in the household development cycle can all be relevant. Women are liable to constitute a distinct group of stakeholders in most fisheries and women from different social and economic backgrounds may also have distinct and different interests. Special attention needs to be paid to coastal fisheries with relatively easy access as there may be quite important involvement of women which is not always very obvious and which needs to be specifically investigated.

Different members of catching and processing and other supply chain sectors will have different interests and stakes in the resource according to the benefits they derive from its use. For example, the owner of fishing gear and craft, which represent a major investment, will have a different stake in the resource compared to crew members who may only work seasonally in the fishery and be able to move into other fisheries or other sectors relatively easily.

There is no single best method of stakeholder analysis. Common sense must be applied. Special care must be taken to ensure that voiceless and disadvantaged groups that may include women, youth, the elderly and poor people, are not excluded from the analysis. Multiple group memberships are common, especially in small communities. In such cases it will be necessary to be certain “who is speaking” at any given time and “which hat” they are wearing.

## **Stakeholder analysis poses questions such as:**

- Who is directly affected by the problem situation being addressed?
- What are the interests of various groups in relation to the problem?
- How do groups perceive the management problem to affect them?
- What resources do groups bring to bear (for good or bad) on the problem?
- What organizational or institutional responsibilities do the groups have?
- Who should benefit, or be protected from, management interventions?
- What conflicts are there between groups and how may these be managed?
- What management activities may satisfy the interests of the various groups?

# Stakeholder analysis – continued



## EAF tool tips

The importance of stakeholder analysis lies mainly in its ability to ensure that the many “actors” who need to be involved in the EAF process are properly identified and characterized in terms of their interests in the particular circumstance and some of their interactions that relate especially to power. Without stakeholder analysis being done at the start of the policy and planning cycles it is likely that critical stakeholders will be omitted from the process and this will eventually lead to problems with EAF implementation. It is an important analytical tool that also helps to promote transparency and effectiveness in the outcome. Even if this is not done in a formal manner, it needs to be done in an informal manner and is something that the EAF planning team needs to consider carefully in their initial roadmap planning phase, as it affects how the entire EAF planning and implementation process should be run, especially who should be involved and how.

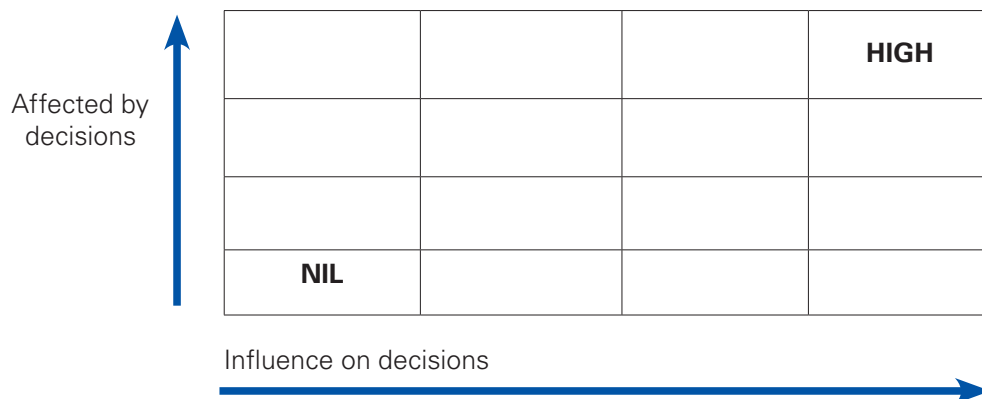
If not much is known it may pay to do a preliminary analysis to determine at what scale (if any) the final analysis should be, to have an appropriate understanding of these issues.

**The stakeholder analysis tool** (modified from FAO, 2009).

### Step 1.

Prepare a big sheet of paper with the list of steps to be followed and draw a matrix/grid with four quadrants on the bottom right hand quarter of the big sheet. Beside the “x” and “y” axis, label the grid as seen on Figure 1 below. Place an “X” above the grid.

**Figure 1 Stakeholder matrix**





# Stakeholder analysis – continued

## Step 2.

Ask the participants for the names of stakeholder groups that are affected by the EAF planning process. They should number and list these along the left hand side of the big sheet with space in between for circles that will be added in the next step.

## Step 3.

Ask the participants to assign how affected each stakeholder group is likely to be from 0 (nil), up to 4 (maximum impact). The bigger the number, the more affected the stakeholder group may be by any changes in fishery management decisions arising from the EAF process.

## Step 4.

Write the appropriate stakeholder's number onto a sticky note or piece of paper which can then be placed onto the large matrix in relation to their influence on management decisions – again using four level scale from 0 (no influence) to 4 (total control). They should position their number, depending on their perceived influence of that stakeholder over fisheries decisions.

## Step 5.

Use this information to consider such items as the likely attitudes of the various stakeholders to the project, their attitude to the project team and any risks associated with their involvement in the project (Table 1). Then consider what changes may be required to stakeholder engagement to minimize any risks and/or to increase their appreciation of, and commitment to, the project.

**Table 1** - Use this table to outline the characteristics of the main people or groups who are involved in the fishery or who need to be involved in discussion about the management of the fishery.

Name	Role	How are they important?	Where do they fit in the matrix?	Current attitude	What would we like them to do?	Key messages	How (tactics)	When	Who

## Source of information

Kennon, N.; Howden, P. & Hartley, M. 2009. Who really matters? A stakeholder analysis tool. *Extension Farming Systems Journal*, 5(2): 9–17. (Available at [www.csu.edu.au/\\_\\_data/assets/pdf\\_file/0018/109602/EFS\\_Journal\\_vol\\_5\\_no\\_2\\_02\\_Kennon\\_et\\_al.pdf](http://www.csu.edu.au/__data/assets/pdf_file/0018/109602/EFS_Journal_vol_5_no_2_02_Kennon_et_al.pdf)).

O'Hara, P. 2009. *Enhancing stakeholder participation in national forest programmes: tools for practitioners*. National Forest Programme Facility. Rome, FAO. 60 pp. (Available at [www.nfp-facility.org/18939-1-0.pdf](http://www.nfp-facility.org/18939-1-0.pdf)).

Scialabba, N. (ed.). 1998. *Integrated coastal area management and agriculture, forestry and fisheries*. FAO Guidelines. Environment and Natural Resources Service. Rome, FAO. 256 pp. (Available at [www.fao.org/docrep/w8440e/w8440e00.htm](http://www.fao.org/docrep/w8440e/w8440e00.htm)).

Townsley, P. 1998. *Social issues in fisheries*. FAO Fisheries Technical Paper. No. 375. Rome, FAO. 93 pp. (Available at [www.fao.org/docrep/003/w8623e/w8623e00.htm](http://www.fao.org/docrep/003/w8623e/w8623e00.htm)).

# Institutional analysis

## EAF steps

### Activity 1.1 - Initial process planning and determining stakeholder support

#### Purpose

Institutional analysis is used to determine what institutions are involved in policy, planning and implementation within the contexts of the key attributes of the fishery system.

#### Overview

Institutional analysis is the investigation of how formal and informal social rules (institutions) shape human behaviour. Institutional analyses focus on how individuals and groups construct institutions; how institutions operate by patterns of interaction; how they are linked; and the outcomes generated by institutions. Institutional analysis related specifically to aquaculture and fisheries has been reviewed by Townsley (1996) and Scialabba (1998).

Institutional analysis covers both formal and informal institutions. Formal institutions are those such as government agencies, and they typically have a legally defined role, structure, and in some cases, sets of procedures. Informal institutions are those such as business, social or family networks or associations. The latter also have structure and sets of procedures, although these may have no legal or written basis. In either case, institutional analysis requires that both structure and procedures are described and analysed. In essence this requires that the following questions be addressed in relation to any planning issue (such as land or water use):

- What are the rules?
- Who decides, and how (i.e. process and decision criteria)?
- Who implements, and how?
- How and when is progress assessed?
- What are the relationships between different institutions (formal and informal)?

The main types of institution which are likely to be relevant to planning and management of fisheries are:

- Local, district, provincial and national government (formal);
- Agencies and advisors of government;
- Formal and informal business associations;
- Non-governmental organizations (NGOs);
- Religious institutions;
- Town, village or commune decision making structures (formal and informal).

# Institutional analysis – *continued*

## EAf tool tips

Without institutional analysis a clear understanding of the complex interactions and relationships between the actors in fisheries is not likely to be achieved. This understanding is even more important because EAF encompasses a greater number of stakeholders including those in other sectors.

The process of institutional analysis is complex and potentially time- and resource-intensive. While it offers considerable benefits in terms of generating more appropriate and sustainable interventions, it is not a process that can be undertaken lightly.

Institutional analysis involves analysing a broad range of features of people's everyday lives and work. These features should be identified by the people directly concerned, who operate within the institutions being addressed. Particularly where institutional "problems" are widely recognized, it can be relatively easy to encourage discussion and debate, but many features of institutions may appear so "normal" that the people directly involved may not even be aware of them or consider them worth analysing at all. In particular, the way that institutions work and the unwritten "rules of the game" that govern them are often so ingrained that the idea of change may be completely inconceivable for "insiders".

The features of institutional analysis mean that it is one form of "diagnostic" activity in which the role of an "outsider" – someone who is not a participant in the institutions or mechanisms that are the subject of the analysis – is often not only helpful but necessary. Only someone with an outsider's point of view is likely to be able to step back from the institutions in question and look at them from a perspective that allows them to see issues that insiders would probably miss.

At the same time, many of the issues under consideration in an institutional analysis require a detailed knowledge and sensitivity to local practice, history, precedent and culture which an outsider may have little possibility of acquiring, at least in the short term. Hence the importance of assembling a team of people to carry out an institutional analysis that combines an outsider's perspective with an insider's knowledge.



Photo: D. Minkoh/FAO

# Institutional analysis – continued



## Institutional issues: Using rapid rural appraisal tools

(Modified from Townsley, 1996.)

Institutional issues	Examples of Rapid rural appraisal tools
Community level institutions	<ul style="list-style-type: none"> <li>Venn diagrams showing membership, spheres of influence, overlaps and relative importance of different community institutions;</li> <li>Decision trees for species targeted, areas for different coastal waters use and other community level decisions.</li> </ul>
Local administration	<ul style="list-style-type: none"> <li>Mapping areas of responsibility;</li> <li>Venn diagrams of spheres of responsibility;</li> <li>Flow charts of organizational structures;</li> <li>Key informant interviews with local extension officers, local officials.</li> </ul>
Development support agencies	<ul style="list-style-type: none"> <li>Venn diagrams showing areas of activity of different development agencies, overlaps, membership;</li> <li>Local people's ranking of intervention by local agencies according to effectiveness and frequency;</li> <li>Decision trees for local people regarding contacts with local institutions, requests for assistance;</li> <li>Ranking of problems and priorities of different institutions and agencies;</li> <li>Comparison of problem hierarchies of different agencies.</li> </ul>
Effectiveness of fishery management agency	<ul style="list-style-type: none"> <li>Local people's ranking of interventions by management agency services by effectiveness and frequency;</li> <li>Decision trees for fisheries showing reactions to different problems: licensing, compliance, monitoring, etc. - who they contact and why;</li> <li>Comparative ranking of effectiveness of fishery management and other support services – shipping, police, customs, etc.</li> </ul>

## Source of information

IFAD. 2008. *Institutional and organizational analysis for pro-poor change: meeting IFAD's millennium challenge. A source book*. IFAD, Rome. 96 pp. (Available at [www.ifad.org/english/institutions/sourcebook.pdf](http://www.ifad.org/english/institutions/sourcebook.pdf)).

Scialabba, N. (ed.). 1998. *Integrated coastal area management and agriculture, forestry and fisheries*. FAO Guidelines. Environment and Natural Resources Service. Rome, FAO. 256 pp. (Available at [www.fao.org/docrep/w8440e/w8440e00.htm](http://www.fao.org/docrep/w8440e/w8440e00.htm)).

## Other relevant references

Readings on Institutional Analysis: <http://idl-bnc.idrc.ca/dspace/bitstream/10625/26556/5/114510.pdf>

Townsley, P. 1996. *Rapid rural appraisal, participatory rural appraisal and aquaculture*. FAO Fisheries Technical Paper. No. 358. Rome, FAO. 109 pp. (Available at [www.fao.org/docrep/006/w2352e/w2352e00.htm](http://www.fao.org/docrep/006/w2352e/w2352e00.htm)).





# SWOT analysis

## EAF steps

Activity 1.1 - Initial process planning and determining stakeholder support

Activity 3.3 - Management option evaluation and selection

## Purpose

A **SWOT** analysis template, provided below, can be used to evaluate the **Strengths**, **Weaknesses**, **Opportunities** and **Threats** that you may face in undertaking the EAF planning process, or in implementing a proposed set of EAF based management arrangements.

This tool can help the EAF planning team focus on main strengths and any key opportunities whilst avoiding the threats and dealing with any identified weaknesses.

## Overview

A **SWOT** chart can be used to assist everyone in the meeting/workshop focus their attention and sort ideas into the separate headings.

## Why do it?

Developing the **SWOT** analysis chart for your EAF planning process will help you think about what will affect the success of the process. A SWOT essentially tells you what is good and bad about a particular proposal generated from both internal (strengths and weaknesses) and external sources (opportunities and threats):

- strengths (maintain, build and leverage);
- opportunities (prioritise and optimise);
- weaknesses (remedy or remove);
- threats (try to counter).

## Proceed or not with the EAF planning?

If the SWOT analysis is being used to formally assess whether the EAF planning process should proceed, it could be that the analysis shows that the proposition is currently too weak to progress at this point, and hopefully what would be needed to address these weaknesses.

## Assess management options

If the SWOT is used to assess different management options it could indicate this set of options is not strong compared with the SWOT's alternative propositions. If the proposal is strong then this analysis should support the decision to proceed and you can then translate each of the issues into category actions with suitable ownership by team(s).

# SWOT analysis – *continued*

## **How does it work?**

This method works by individuals generating different suggestions for each of the four different areas until there are no more new thoughts to fill in the chart. A set of questions has been provided to help generate the thoughts for each of the four areas.

These thoughts can then be refined and potential solutions developed for the negative aspects, from which you should be in a much better situation to determine if the roadmap plan you have developed for EAF planning is likely to be successful, or whether the set of management options you have developed will have a reasonable chance of success.

The best thing about this tool is that it recognizes that there are usually two different sides (positive and negative) to any given issue or situation and it encourages discussion of both. It helps to set the basis for negotiations and trade-offs.

Open, in-depth, focused and frank discussions are facilitated because agreement must be reached to identify what is a strength and what is a weakness. What is seen as a strength by one person may be a weakness to another.

SWOT analysis encourages thinking about creating opportunities, considering strengths and weaknesses, and the limitations that might be present.

## **Who needs to be involved?**

A SWOT can be undertaken by the project leader, it can involve the project team or it can be done by a broader group.

If a group is involved, the process of identification can be done together as one large group, or if the group is large, by a series of smaller groups (or even individually) that all report back to the larger group.

One of the advantages of group work like a SWOT is that it can bring more and new ideas to the table including many that you may not have thought of on your own.

# SWOT analysis – *continued*

## EAF tool tips

- When developing the **SWOT** chart, it helps to ask a series of questions similar to the examples provided in the template below.
- Participants in a SWOT analysis can become confused unless the differences between strengths and opportunities and between weaknesses and threats are clearly explained.
- It also helps to conduct the SWOT analysis in clear steps, starting with strengths and weaknesses (often based on looking back in time), before moving on to opportunities and threats (looking forward).
- Make sure the proposal being analysed by your SWOT is definable, measurable, and clear. So preferably only accept precise, verifiable statements (“Cost advantage of US\$10/ton in sourcing raw material x”, rather than “Good value for money”).
- There are limitations to SWOT; it will not fix anything unless you aim to actually apply and utilize what you have defined.
- If you break into groups to develop your SWOT, each group would need a facilitator to keep the group on track during the process.
- Remember that the first stage is a great way to get a large range of different backgrounds and perspectives that can then be narrowed down.
- Give each participant cards and markers. It is useful to limit the number of cards per person to ensure that the exercise is not dominated by some participants. As a rule of thumb, four cards per person, per column is a good maximum number for a group of five people, and one or two cards per person, per column for a group of 30.
- As with all other participatory methods using cards, ask the participants to write clearly and in large letters with only one idea per card, as cards will be grouped.
- Sensitive subjects may arise. The facilitator may wish to change the topic and return to the sensitive point later on. This can reduce the chance of possible problems.
- Some of the group may dominate discussion. The facilitator can ask specific persons for input, or the exercise can be done with different focus groups.
- Group similar suggestions together.
- Synthesizing discussion into a few words may be difficult. The facilitator should always check to see that the audience agrees with the reporting.

# SWOT analysis – continued



## SWOT analysis template

<p>Question examples .....</p> <ul style="list-style-type: none"> <li>• Advantages of proposition?</li> <li>• What capabilities do you have including resources, skills, people?</li> <li>• Experience, knowledge, data?</li> <li>• Innovative aspects?</li> <li>• Institutional and political enthusiasm?</li> <li>• Processes, systems, IT, communications?</li> <li>• Cultural, attitudinal, behaviour of staff</li> </ul>	<p><b>Strengths</b></p>	<p><b>Weaknesses</b></p>	<p>Question examples .....</p> <ul style="list-style-type: none"> <li>• Disadvantages of proposition?</li> <li>• Gaps in capabilities?</li> <li>• Lack of time, other deadlines and pressures?</li> <li>• Lack of financial resources?</li> <li>• Reliability of data, plan predictability?</li> <li>• Institutional morale, commitment, leadership?</li> <li>• Processes and systems, etc.?</li> </ul>
<p>Question examples .....</p> <ul style="list-style-type: none"> <li>• Financial aid or other project funding availability?</li> <li>• Improved industry or stakeholder lifestyle?</li> <li>• Technology development and innovation?</li> <li>• Global influences, new or niche markets that may become available?</li> <li>• New information and research?</li> <li>• Partnerships including with other government agencies?</li> </ul>	<p><b>Opportunities</b></p>	<p><b>Threats</b></p>	<p>Question examples .....</p> <ul style="list-style-type: none"> <li>• Political effects?</li> <li>• Legislative effects?</li> <li>• Environmental effects?</li> <li>• Market demand?</li> <li>• Vital partners?</li> <li>• Sustaining internal capabilities?</li> <li>• Loss of key staff?</li> <li>• Sustainable financial backing?</li> <li>• Economy – local, world?</li> </ul>

## Source of information

[www.businessballs.com/swotanalysisfreetemplate.htm](http://www.businessballs.com/swotanalysisfreetemplate.htm)

[www.freshthinkingbusiness.com/swot-analysis.html](http://www.freshthinkingbusiness.com/swot-analysis.html)

[www.kstoolkit.org/SWOT+Analysis](http://www.kstoolkit.org/SWOT+Analysis)





# Cost-benefit analysis

## EAF steps

**Activity 1.1 - Initial process planning and determining stakeholder support**

**Activity 3.3 - Management option evaluation and selection**

## Purpose

A cost-benefit analysis (CBA) can be used to assess whether the case for undertaking a major initiative, such as completing the EAF planning process, is cost effective for government.

A CBA can also be used to determine which of a number of different management options may be the best choice.

## Overview

The CBA process involves explicitly or implicitly weighing the total expected costs against the total expected benefits of one or more actions in order to choose the best or most appropriate option. It works by finding and quantifying and then adding all the positive factors (these are the benefits) and identifying, quantifying and subtracting all the negatives (the costs). The difference between the two indicates whether the planned action is advisable. The real trick to doing a CBA well is to make sure you include all the costs and all the benefits and properly quantify them.

In most cases, both the benefits and costs are expressed in money terms and can also be adjusted for the “time value” of money, so that all flows of benefits and flows of project costs (which tend to occur at different points in time) are expressed on a common basis in terms of their “present value” using what is called a discount rate. Most commonly, the discount rate used for present-value calculations is an interest rate taken from financial markets.

The choice of the discount rate can be very controversial because a high discount rate implies a very low value on the welfare of future generations, which may have a huge impact on the desirability of interventions to help the environment. Empirical studies suggest that in reality, people’s discount rates do decline over time. Because CBA aims to measure the public’s true willingness to pay, this feature is typically built into studies.

One of the main problems with CBA is that it requires translation of all values for a given proposal into economic terms. This is seen by many who favour CBA to be its chief asset because it uses economic value as a universal metric which they say is the least biased way to judge the impact of regulatory decisions. Such analyses are, however, rarely ever neutral and all data, including non-economic data, must be considered in the context of the decision that is being made.

Also, no matter how clever the mathematics, certain key inputs in a CBA cannot be translated into economic value. Security and safety, the preservation of wildlife and open spaces, the reduction of fear in a community, and scientific uncertainty in fields that spawn technological innovation are all economic intangibles.

Another challenge to CBA comes from determining which costs should be included in an analysis (the significant cost drivers). This is often controversial because organizations or interest groups may think that some costs should be included or excluded from a study. This is especially true when governments use the technique, for instance to decide whether to introduce business regulation, build a new road, or offer a new drug through the state healthcare system. In this case, a value must be put on human life or the environment, often causing great controversy.

# Cost-benefit analysis – *continued*

## EAF tool tips

For EAF based CBAs, several of the management costs (e.g. for management, research, data handling, additional meetings, monitoring and observers) are readily assessed from governmental sources of information, possibly supplemented by suitable surveys. Other costs (e.g. the risks of non-compliance or of collapse of the management system) are difficult to measure objectively, but may be amenable either to modelling or to surveys and interviews. Most of the benefits listed (e.g. better integration in management across fisheries, clearer expression of management objectives, better balancing of multiple objectives and of multiple uses, etc.) are difficult to assess objectively, although some (e.g. improved compliance through better participation) can be assessed based on available data (e.g. infractions reports).

Economic benefits and costs are generally easier to measure. First, some are amenable to standard fishery data gathering – e.g. for benefits or costs at the fisher level (such as changes in income per fish caught, in catch levels, and in fishing costs), and for those at the sector level (such as changes in employment, net economic returns, and contribution to the economy). Some measures can be obtained through governmental accounting systems (such as changes in the revenues from licenses, etc.). Still others may require more specific data collection, e.g. through surveys to assess changes in livelihood opportunities for fishers, or in increased income disparity among fishers.

The social benefits and costs noted above are generally much more challenging to assess. This is certainly the case, for example, with changes in management efficiency and overall resilience of the human system. However, effects on the food supply, on poverty levels, on levels of inequity and on conflict all have objective methods for measurement. Thus there is likely to be a wide variation in the ability to measure social benefits and costs.

## Benefits and costs of EAF

The ecosystem approach to fisheries (EAF) has the potential to produce a variety of benefits, both general (e.g. ecosystem health, sustainable natural resource use) and more specific, notably those relating to human considerations (such as greater employment and income generation, aesthetic benefits). On the other hand, potential costs of implementing EAF include direct costs of implementation (e.g. increased management costs) and indirect or induced costs (e.g. the risk of reduced employment and/or revenues in the short term). To assess the consequences of moving to EAF management, it is necessary to (1) determine what are the relevant benefits and costs, and then (2) measure each of these and draw conclusions from comparing the benefits and costs. Consider the first of these steps. While this can only be carried out fully given the details of a specific fishery, it is possible to consider in general the various possible benefits and costs that might arise from EAF management.

Table 1 lists some of these benefits and costs, grouped under the four headings: ecological, management, economic and social. Two points must be noted here. First, this is simply a generic listing of possibilities, with no claim to being exhaustive. Second, the categories used here are intuitively sensible, but are not those typically used in formal cost-benefit analysis or social impact assessment. For example, in cost-benefit analysis, economists view “economic” costs and benefits as all those of a societal or “global” nature (thus including most ecological and social aspects) while “financial” costs and benefits are monetary aspects as seen from a private perspective. For some entries in Table 1, an indication is given of the conditions or particular situations that may produce the benefit or cost in question, but ultimately the potential magnitude of the benefit or cost, and its probability of occurrence, will depend on the specifics of the fishery and of EAF implementation. Note that in the case of a cost of EAF, for a given fishery, the product of the probability of occurrence and the magnitude of the cost represents the “risk” associated with that cost.

# Cost-benefit analysis – *continued*

**Table 1** Some possible benefits and costs of implementing EAF

Ecological benefits and costs	
Benefits	Costs
Healthier ecosystems (directly or with EAF linkages to effective ICAM)	Decreased fish stocks (if fishery management is now less effective than previously)
Increased global production of goods and services from aquatic ecosystems (a global benefit)	Increased habitat damage (if management is now less effective or creates induced impacts)
Improved fish stock abundance (due to healthier ecosystems)	Shift in fishing effort to unprotected areas, leading to a loss of genetic biodiversity
Reduced impact on threatened/endangered species	Greater high grading/dumping, and thus more wastage (if catch and/or bycatch is restricted)
Reduced bycatch of turtles, marine mammals, etc.	Reduced fish catches (if more predators, e.g. seabirds, seals, due to better protection)
Less habitat damage (due to more attention to fishing impacts)	
Lower risk of stock or ecosystem collapse	
Reduced contribution of fisheries to climate change (if EAF leads to lower fuel usage)	
Improved understanding of aquatic systems	
Management benefits and costs	
Benefits	Costs
Better integration in management across fisheries, other uses, etc.	Increased cost of management
Clearer expression of management objectives, leading to greater societal benefits	Increased cost of research
Better balancing of multiple objectives	Increased cost of data collection and data management
Better balancing of multiple uses, leading to increased net benefits	Increased cost of coordination across fisheries and aquatic uses
More robust management due to broadening from single species tools	Increased cost of additional and more participatory meetings
Improved compliance due to more “buy-in” to management through better participation	Increased cost of monitoring, observers, etc.
	Increased risk of non-compliance (if regulations too complex or unacceptable)
	Increased risk of collapse of management system (if too demanding of resources)
	Risk of management failure (if excessive faith placed in “new” EAF paradigm)
	Poor management results and loss of support (if EAF imposed or implemented improperly)

# Cost-benefit analysis – continued



Economic benefits and costs	
Benefits	Costs
Increase in benefits to fishers per fish caught (bigger fish from a healthier ecosystem)	Reduced catches (especially in short term)
Increased catches (especially in long term)	Loss of income to negatively affected fishers
Increased contribution to the economy (especially long term)	Increased income disparity among fishers (if EAF impacts are uneven)
Reduced fishing costs (if EAF results in reduced bycatch)	Reduction of government revenues from licenses, etc. (if there is reduced effort)
Increased net economic returns (if EAF involves reduced fishing effort, towards MSY)	Reduction in benefits to fishers (if lower government support)
Higher-value fishery (if increased availability of food to top predators increases stock sizes)	Reduced contribution to economy (short term)
Greater livelihood opportunities for fishers (e.g. in tourism, if charismatic species abundances increase through EAF)	Reduced employment in short term and possibly long term
Increased non-use (e.g. cultural) and existence values (the latter resulting from appreciation of healthier aquatic systems and a greater abundance of aquatic life, etc.)	

Social benefits and costs	
Benefits	Costs
Positive impacts on food supply in long term (if greater catches become possible)	Negative impacts on food supply in short term (and risk of this also in long term)
Synergistic positive effect of coordinated EAF across fisheries and/or nations (LME)	Greater inequity (if EAF favours those able to invest in appropriate technology)
Greater resilience (if there is emphasis on multiple sources of fishery livelihoods)	Greater inequity (if there is misplaced allocation of responsibility for EAF costs)
Greater resilience (if increased bycatch results in more livelihood opportunities)	Increased poverty among those adversely affected by EAF (short term, or both)
Reduced conflict (if EAF processes deal effectively with interfishery issues)	Reduced benefits to fishers (if EAF linked to ICAM, and tradeoffs detrimental to fishers)
	Greater conflict (if EAF leads to enforced interaction among a larger set of societal and/or economic players)



# Cost-benefit analysis – continued

## Source of information

Caruso, D. 2008. The myth of cost-benefit analysis. *Strategy & Business* (50). (Available at [www.strategy-business.com/article/08103?pg=5](http://www.strategy-business.com/article/08103?pg=5)).

De Young, C.; Charles, A. & Hjort, A. 2008. *Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods*. FAO Fisheries Technical Paper. No. 489. Rome, FAO. 2008. 152 pp. (Available at [www.fao.org/docrep/010/i0163e/i0163e00.htm](http://www.fao.org/docrep/010/i0163e/i0163e00.htm)).

## Other relevant references

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Mishan, E.J. & Quah, E. 2007. *Cost-benefit analysis*. Routledge. 316 pp.

Vestergaard, N.; Stoyanova, K.A. & Wagner, C. 2010. *Cost-benefit analysis of the Greenland offshore shrimp fishery*. University of Southern Denmark, Department of Environmental and Business Economics. Working Papers number 98/10. 40 pp. (Available at <http://ideas.repec.org/p/sdk/wpaper/98.html>).





# Participatory Rapid Community Assessment (PRCA)

## EAF steps

**Activity 1.1 - Initial process planning and determining stakeholder support**

**Activity 1.2 - Defining the fishery, societal values and high level objectives**

**Activity 1.3 - Finalise the scoping and background document**

## Purpose

A Participatory Rapid Community Assessment (PRCA) or appraisal (PRA) involves discussions with key stakeholders including local fisheries staff, researchers and members of the fishing community as a critical first step in documenting and evaluating the existing informal (including traditional) fisheries management systems operating in the community.

## Overview

PRCA focuses on resource assessment from the perspective of local coastal resource users. Scientific information is very useful and important during resource analysis, but the type of information gathered by scientists differs from that obtained from coastal resource users, and the techniques used to acquire the information are also different. PRCA relies heavily on participation by the communities visited, as the method is designed to enable local people to participate, not only as sources of information but as partners with the team, gathering and assisting in the analysis of information. Visual techniques come into play, allowing non-literate people to participate fully. Since there is no one blueprint of a PRCA activity, the actual techniques chosen and the manner in which they are used are adaptable to the project or context and the resources available.

PRCA is best conducted by a local team (speaking the local languages) with a few outsiders present; a significant representation of women; and a mix of sector specialists and social scientists, according to the topic. The team spends time in the communities, not only in information-gathering but also with in-the-field analysis and initial planning.

The data that are collected are often not conducive to statistical analysis (given their largely qualitative nature and relatively small sample size), but alternative ways have been developed to ensure the validity and reliability of the findings. These include sampling based on approximate stratification of the community by geographic location or relative wealth, and cross-checking – that is, using a number of techniques to investigate views on a single topic (including a final community meeting to discuss the findings and correct inconsistencies).

## Key techniques

**Interviews/discussions:** individuals, households, focus groups, community meetings.

**Mapping:** community maps, habitat census, personal maps, institutional maps.

**Ranking:** problem ranking, preference ranking, wealth ranking.



# Participatory Rapid Community Assessment (PRCA) – *continued*

**Trend analysis:** historical diagramming, seasonal calendars, daily activity charts

The central part of any PRCA is semi-structured interviewing—that is, interviewing based not on a questionnaire but on a checklist of issues that the PRCA team adapts according to the interview situation. These interviews are, therefore, more like conversations guided informally by the interviewers. While sensitive topics are often better addressed in interviews with individuals, other topics of more general concern are amenable to focus group discussions and community meetings. During these interviews and discussions, several diagrammatic techniques are frequently used to stimulate debate and record the results. Many of these visuals are not drawn on paper but on the ground with sticks, stones, seeds, and other local materials, and then later transferred to paper for a permanent record.

Mapping techniques are very useful for PRCA activities and involve community members depicting the characteristics of their community, or individuals drawing their own personal perspective of the community and the areas of most importance to them, or key informants mapping the extent to which local organizations interact with each other. Ranking exercises, done either by individuals or groups, reveal the priority problems and preferences of the population or, in wealth ranking, the local definition and indicators of poverty and the stratification of the community. Other diagrams address the historical and seasonal trends and daily routines of local livelihoods.

## **EAF tool tips**

PRCA offers the following beneficial outcomes:

- The resource users become more aware of the status of their resources and problems.
- PRCA can be an educational tool that increases stakeholder's analytical thinking.
- It can mobilise the community's sense of ownership of and responsibility for their environment and assist in developing solutions.

PRCA has the following limitations:

- Information generated is at best indicative and may lead to overgeneralisation.
- Being conducted in a short time frame means that some stakeholders may be left out and those that are not influential may be excluded.
- Local facilitators may not be sufficiently trained in the first instance to generate the best outcomes from the exercises.

A number of manuals, handbooks and sourcebooks of PRCA methods have been compiled. However, PRCA practitioners commonly suggest that manuals and methods should be avoided and that the principle "use your own best judgement at all times" is best to encourage creativity and flexibility.

The training manual developed for the Philippines (Pido *et al.*, 1996) is a good source of detailed information on PRCA and it includes a number of worksheets that could be used directly or adapted for use in any coastal community.

# Participatory Rapid Community Assessment (PRCA) – continued



## **Semi-structured interviewing:** organizing tips

- The interview team should consist of two to four people of different disciplines.
- Begin with the traditional greeting and state that you are there to learn.
- Begin the questioning by referring to someone or something visible.
- Conduct the interview informally and mix questions with discussion.
- Be open-minded and objective.
- Let each team member finish their line of questioning (don't interrupt).
- Carefully lead up to sensitive questions.
- Assign one note-taker (but rotate).
- Pay attention to nonverbal cues.
- Avoid leading questions and value judgements.
- Avoid questions that can be answered with "yes" or "no."
- Individual interviews should be no longer than 45 minutes.
- Group interviews should be no longer than two hours.

## **Source of information**

Davidson, S.; Ouellet, M. & Robichaud, M.J. 2007. *A preliminary rural livelihood assessment community dynamics and income diversification strategies in La Zahina, Panama*. ENVR 451 – Research in Panama McGill University. (Available at [www.crea-panama.org/files/reports\\_and\\_papers/mcGill%20report\\_small.pdf](http://www.crea-panama.org/files/reports_and_papers/mcGill%20report_small.pdf)).

Deguit, E.T.; Smith, R.P.; Jatulan, W.P. & White, A.T. 2004. *Participatory coastal resource assessment training guide*. Coastal Resource Management Project of the Department of Environment and Natural Resources, Cebu City, Philippines. 134 pp. (Available at [http://oneocean.org/download/db\\_files/pcra\\_training\\_guide.pdf](http://oneocean.org/download/db_files/pcra_training_guide.pdf)).

Rietbergen-McCracken, J. & Narayan, D. 1998. *Participation and social assessment: tools and techniques*. The International Bank for Reconstruction and Development. 347 pp. (Available at <http://info.worldbank.org/etools/docs/library/238582/toolkit.pdf>).

## **Other relevant references**

Pido, M.; Pomeroy, R.S.; Carlos, M.B. & Garces, L.R. 1996. *A Handbook for rapid appraisal of fisheries management systems (Version 1)*, ICLARM Educ. Ser. 16. International center for living aquatic resources management.

Theis & Grady, H. M. 1991. *Participatory rapid appraisal for community development: a training manual based on experiences in the Middle East and North Africa*. Save the children federation and the international institute for environment and development. London.

Walters, J.S.; Maragos, J.; Siar, S. & White, A.T. 1998. *Participatory coastal resource assessment: a handbook for community workers and coastal resource managers*. Coastal resource management project.





# Visioning exercises

## EAF steps

### Activity 1.2 - Defining the fishery, societal values and high level objectives

#### Purpose

Assist the stakeholders (including the community and government) of a fishery to generate an agreed set of key values and outcomes for use in EAF planning by encouraging them to look backwards from some future time.

#### Overview

Visioning exercises are used to define and help achieve a desirable future by setting the stage for creating the future through positive discussions. Studies have shown that we are more likely to reach an objective if we can see it, and can then imagine the set of steps needed to reach it.

The aim is to first create a “Vision of Success” statement, which is a brief written account of what a successful management plan would produce over the long-term (i.e. five to 20 years). This statement outlines what would be the result from the successful implementation of an EAF Management Plan and what would define the high level fishery objectives which, if achieved, would produce that success. The basis of this method is that if you don’t know what success might look like it is very difficult to get there.

The exercise is therefore intended to present the participants with a scenario in which they can **visualize** the fishery as successful, but without the facilitator **dictating** what the success looks like. Therefore, the visualization presents the “outline” but each participant colours in the outline with his/her particular view.

This can be done in a number of ways:

1. Ask the group “Five (10, 20) years from now, if your new fishery management programmes are hailed as a great success, what will that success look like?” Then have the group brainstorm a list of characteristics and/or outcomes which would indicate this success.
2. Hand out copies of a visioning exercise (see example below) and allow time for the group to complete the exercise. You may want participants to have been provided with this beforehand and return it or mail it prior to the group meeting. It is very effective to compile the answers before returning the entire copy to participants.
3. The “Cover story vision” is an imaginative exercise where the group envisages their fishery on the cover of a magazine. They build the story in parts: creating the big headlines, the sidebar stories, the images and the quotes, as well as the cover (deciding which magazine or web-zine they are being featured in). This exercise gets the group dreaming about what they really want and what success means to them. In a subtle way, it brings out the essence of what they want to become.

# Visioning exercises – *continued*

## EAF tool tips

Visioning encourages participation for developing a long-range plan and is an integrated approach to policy-making. With overall goals in view, it helps avoid piecemeal and reactionary approaches to addressing problems. Visioning uses participation as a source of ideas in the establishment of long-range policy. It draws upon deeply held feelings about overall directions of public agencies to solicit opinions about the future. When completed, visioning should have developed a democratically-derived consensus.

The method could be used first by the EAF planning team to test it and then, if it appears to have merit, it could be extended to the broader stakeholder group.

**Pros of visioning** – Visioning generates a common goal, hope, and encouragement; offers a possibility for fundamental change; gives people a sense of control; gives a group something to move toward; and generates creative thinking and passion. Whereas a *problem* is something *negative* to move *away* from, a *vision* is something *positive* to move *toward*.

**Cons of visioning** – Sometimes visioning can lead to poor results because people can't aspire to something they don't know. In such situations you may need to present a range of options each with a list of pros and cons. Once this has been done satisfactorily, people can then be asked, "What do you want?"

**A visioning exercise for fisheries** (Adapted from [www.kstoolkit.org](http://www.kstoolkit.org))

### Revisiting your fishery

In your mind's eye, please think quietly and deeply about the following imaginary experience.

Tomorrow it becomes necessary for you to move away from this fishery and the area. You have to make changes and develop a life for yourself elsewhere and it is not possible for you to go back for a visit until 20 years later. Twenty years is a long time – not a lifetime, but enough time to notice changes.

As you wander back through the area you left, you happen to meet four people, a current fisher, a retired fisher, a community citizen and an elected official.

What would you like each of these people to say about the "current" (20 years on) state of your fishery?

What kind of fishery is it today? What are its values? What difference did your group make to the lives of these people? What kind of character did this group develop? What were the group's greatest accomplishments since you moved?

What was the main purpose for its existence?

Here come the speakers. What would you like each one to say?

1. A current fisher
2. A retired fisher
3. A community citizen
4. An elected official

This can be done as an individual exercise or in a group of no more than four as everyone needs to directly document at least one perspective.

### Source of information

[www.ag.ohio-state.edu/~bdg/pdf\\_docs/e/E05.pdf](http://www.ag.ohio-state.edu/~bdg/pdf_docs/e/E05.pdf)

[www.kstoolkit.org/Visioning+Exercises](http://www.kstoolkit.org/Visioning+Exercises)



# Participatory sketch, scale and photo mapping

## EAF steps

### Activity 1.3 - Finalise the scoping and background document



Photo: A. K. Kimoto/FAO

#### Purpose

To gather and document spatially based local knowledge about the fishery and the surrounding coastal environment.

#### Overview

Sketch maps are free-hand drawings that can reveal much about both the coastal areas represented in the maps as well as the people who draw them. Sketch maps start as large blank pieces of paper and are drawn from fishers' memory in order to gather information on community-identified features or, in other words, provide a glimpse of fishers' "mental maps" of the environment. Participants are encouraged to exaggerate the size of features according to the importance attached to them. The process should be documented in order to interpret depicted symbols. The lack of consistent scale and geo-referencing of information can leave room for subjective interpretation of the final map.

Scale mapping is also a participatory mapping exercise in which information gathered is drawn on existing scale (or base) maps. Photo mapping involves the use of photographs (i.e. aerial pictures, satellite imagery) as a basemap.

Marine habitats, resources and space-use patterns include the types of information that can be collected through scale mapping exercises. Scale maps serve to orientate the participant to the area of interest through the use of an accurate georeferenced basemap.

In all cases, local knowledge is gathered in conversation around the map and for scale mapping information is drawn directly upon the map. The use of a scale map provides for relatively accurate positioning of features and the representation of an area relative to natural landmarks. Information drawn on the scale map can then be incorporated into some form of a GIS through georeferencing and digitising of features, if required.

#### EAF tool tips

Sketch, scale and photo maps can be particularly useful during the early stages of EAF in order to provide the least biased view of how fishers perceive their surroundings, thereby providing a glimpse of the fishers' "mental maps" of the coastal environment.

Sketch maps are particularly useful to engage non-expert users with little previous experience because the process of participating can build confidence in the importance of local knowledge and the stakeholders' role in participatory research.

Photo mapping provides a good format for participatory mapping since pictures (unlike scale maps) are easily understood by most stakeholders. Taking the time to collaboratively review the map from an aerial perspective and identify landmarks at the onset of the exercise can lead to easy conversation about the local environment.

#### Source of information

Integrated Approaches to Participatory Development (IAPAD): Participatory mapping toolbox. (Available at [www.iapad.org/toolbox.htm](http://www.iapad.org/toolbox.htm)).

Training Kit on participatory spatial information. (Available at <http://pgis-tk-en.cta.int/m08/index.html>).



# Social and economic assessment methods

## EAF steps

**Activity 1.3 - Finalise the scoping and background document**

**Activity 3.3 - Management option evaluation and selection**

## Purpose

The completion of formal social and/or economic assessments to better understand the social and economic status and context of the fishery and its dependent communities.

Social and economic (impact) assessments can also be undertaken to investigate the possible implications of any proposed new management arrangements.

## Overview

Social and economic assessments examine the social, cultural, economic and political conditions of individuals, groups, communities and organizations. A socio-economic assessment allows for stakeholder interests and concerns to be integrated into the management process. They can help to determine the potential effects of management decisions on the stakeholders, to improve policy decisions and minimize adverse impacts and maximize benefits. They can also be used to demonstrate the value of marine resources and services to non-fishery stakeholders and government. The scope of social and economic assessments varies but commonly identified topics include: resource use patterns; stakeholder characteristics (demographics); gender issues; stakeholder perceptions; organization governance; traditional knowledge; community services and facilities; market attributes; and non-market and non-use values.

While the collection and analysis of social and economic information has not been very common for fisheries, there are many well developed and tested methods available. The reports presented below include summaries and outlines of the evaluation methods that can be used to assess the social and economic benefits generated from fishery resources and the impacts of ongoing or new management arrangements. By using the methods outlined here, fishery researchers and managers will be able to incorporate social and economic factors into fishery management decision making.

Social and economic evaluations can both involve the analysis of the benefits and costs that are derived by an individual, group or community from their use of a given fishery resource. Economic evaluations focus on net economic benefits, which describe benefits through the use of prices and markets. Social evaluations tend to focus on a broader definition of benefits and costs that an entity derives from a given activity or resource. Often, the benefits or costs to society that are assessed in social evaluations are not captured in market-based terms (as used in economic evaluations). The large number of factors that can be dealt with in social evaluations means that such evaluations can focus on a variety of issues and produce multiple outputs. In addition, the breadth of social evaluations means they can be undertaken using both qualitative and quantitative methods.



# Social and economic assessment methods – *continued*

There are a number of reviews now available on social and/or economic assessment methods in relation to fisheries (see list of sources and references below). A summary of the various types of social and economic evaluation methods derived from these reports is provided below. Some of the reports also provide relevant case studies. Given the large number of methods available, this fact sheet only provides an introduction to this topic. The summaries and the reviews have the details that will help to determine whether any of these methods need to be applied, and if they can be applied in the circumstances.

## **EAF tool tips**

### **Economic evaluations**

Where one of the high level fishery management objectives involves optimizing the economic benefit – and requires an allocation of resources (such as time, labour, capital, fish stocks, etc.).

This can refer to:

- Net economic benefit – the difference between the economic benefits earned and the economic costs incurred from the use of a resource. This outcome is also referred to as an efficient allocation of resources.
- Total economic benefit – any benefit received from using a resource. This can include the revenue earned from commercial harvesting of fish, or the non-monetary benefit associated with the recreational harvest of fish. Economic costs refer to any costs that are incurred in order to earn such economic benefits. This may include the cost associated with inputs, such as fuel and labour, in commercial fisheries, or the cost of recreational fishing gear.
- Economic evaluations generally examine net economic benefits and economic efficiency. An economic evaluation might look at the current and/or historical net economic benefits generated from the use of a fishery resource. Alternatively, an economic evaluation might investigate the level of net economic benefits that could be earned from the use of a fishery resource in the future, or under different settings. In terms of economic efficiency, an evaluation might determine a fishery's optimum efficiency level and compare previous performance against that level.

### **Social evaluations**

Social evaluations cover many aspects that affect societies, beyond mere levels of financial or economic activity. They include livelihood aspects such as food security and social impacts.

Social research may involve any one of a wide range of data collection and analysis methods, including (but not limited to):

- Qualitative analysis of primary data, e.g. using interviews, focus data directly from individuals and groups. Data are typically presented in descriptive format;
- Qualitative analysis of secondary data, e.g. analysing historical records and accounts to examine the history and culture of an area or an industry;
- Qualitative and quantitative surveys of particular groups, using mail, phone, internet or face-to-face surveys. Quantitative data are typically presented using numerical analyses of how many people have particular characteristics;
- Quantitative and qualitative analysis of statistical data;
- Quantitative modelling which attempts to represent some aspect of human society and its behaviour.

# Social and economic assessment methods – *continued*



## A summary of economic and social assessment methods

### 1 ECONOMIC EVALUATION METHODS

#### 1.1 Economic evaluation methods for market based uses:

These evaluation methods can be used to evaluate the economic performance of commercial fisheries, where markets exist for the fishery output, and the inputs used to produce that output.

##### 1.1.1 Market based economic valuation

A market based economic valuation of a commercial fishing sector estimates the total net economic benefits generated from the use of a fishery resource in a given time period.

**Relevant to:** Commercial sectors.

**Output:** Total net economic benefits and marginal net economic benefits in a commercial sector.

**Usefulness:** Indicator of economic performance. The data collected can also be used to undertake other economic valuations and to determine the parameters of bio-economic models.

**Data:** Revenue and cost data. Access to data depends on industry cooperation.

**Time/cost:** Medium–high given large data requirements.

##### 1.1.2 Productivity and efficiency analysis

A fully efficient firm is said to be operating with the maximum amount of output that can be produced from available inputs (labour, capital, etc.). A firm that approaches this production frontier is said to be becoming more efficient. There are four possible sources of productivity gains in fisheries. These include improvements in technology, adoption of existing technologies (previously prevented due to a slow response by operators or management regulations), increased or newly found fish stocks and structural shifts towards more productive vessels, which are all influenced by management.

**Relevant to:** Commercial sectors.

**Output:** Efficiency and productivity indicators and analysis.

**Usefulness:** Useful indicator of economic performance.

**Data:** Revenue/cost data, price data, catch data, input usage data, effort data, vessel characteristics.

**Time/cost:** Medium–high given large data requirements and analysis.

# Social and economic assessment methods – *continued*

## 1.2 Economic evaluation methods for non-market based uses and values:

Used to evaluate the economic benefits associated with non-commercial uses/values of fishery resources that are generally not associated with an observable market. These can include extractive uses (such as recreational fishing), non-extractive uses (such as diving) and non-uses (such as option values and existence values).

### 1.2.1 Non-market economic valuation (revealed preference): *travel cost method*

The travel cost method (TCM) is an indirect valuation method used to estimate the consumer surplus per fishing trip using the travel cost as a proxy for the price of the recreational activity. For fishery evaluations, the method has most commonly been used to estimate the resource values of recreational anglers, yet could also be used for other user groups (such as non-extractive users).

**Relevant to:** Non-market users such as recreational fishers.

**Output:** Net economic benefits associated with the use of a resource.

**Usefulness:** Can be compared with the net economic benefit of the commercial sector so that allocation decisions between sectors can be made.

**Data:** Participation cost data (e.g. travel costs), participation rates, social and economic data relating to fishers. Requires survey data collection.

**Time/cost:** High given large data requirements.

### 1.2.2 Non-market economic valuation (stated preference method): *contingent valuation method*

The contingent valuation method (CVM) is a “method of estimating consumer surplus based on individual responses to contingent circumstances posited in hypothetical or experimental markets”. The objective of the CVM is to collect a stated value or willingness to pay and/or accept compensation that is attached to a particular hypothetical scenario or circumstance by survey respondents. This sample of stated values is then used to estimate the benefit that would arise for an entire population if that circumstance actually occurred.

**Relevant to:** Non-market users (e.g. recreational fishers) and non-users (e.g. public).

**Output:** Net economic benefits associated with users and non-users of a resource.

**Usefulness:** Output can be compared with net economic benefits in commercial sector to make allocation decisions and allows non-user values to be assessed.

**Data:** Stated hypothetical values, behaviour and preferences of respondents, participation rates, social and economic data relating to respondents. Requires survey data collection.

**Time/cost:** High given data requirements.

## 1.3 Other non-specific economic evaluation methods

### 1.3.1 Bio-economic modelling

Bio-economic models are generally considered to be tools rather than an evaluation method and are similar to biological population models in that the aim of both is to provide a simplified version of a very complex system of relationships. Bio-economic models can be thought of as an extension of these biological population models in that the economic and management characteristics of the fishery are imposed on the biological relationships of the system being modelled.

**Relevant to:** The use of a fishery resource by any sector.

**Output:** Net economic benefits under different scenarios.

**Usefulness:** Can determine what management settings are economically optimal as well as how changes to a fishery's operating environment will impact on fishery profitability.

**Data:** Very data intensive. Requires biological, economic, catch and effort/participation data.

**Time/cost:** High given large data requirements and complexity.

### 1.3.2 Regional economic impact assessment methods

A regional economic impact estimation method includes any technique in which a model is used to understand and simplify an economy (at the local, regional, national or international level) to determine the impact that a sector (e.g. a commercial fishery) has on the economy of the region. Such approaches deal only with economic activity and not net economic benefits. Consequently, such approaches don't provide the information necessary for making resource allocation decisions under an objective of maximising net economic benefits.

**Relevant to:** Regions.

**Output:** Economic activity generated by a sector (or fishery).

**Usefulness:** Provides an understanding of the economic links of a sector to other sectors in a region(s) and the distribution of economic activity.

**Data:** Methods of modelling economic impacts can be data intensive. Multiplier analysis often uses input-output tables.

**Time/cost:** High given data requirements although using existing models (e.g. input-output tables) can reduce cost for economic impact analysis.



# Social and economic assessment methods – *continued*

## 2. SOCIAL EVALUATION METHODS

### 2.1 Media analysis

Media analysis is a useful method for identifying publicly reported perceptions about marine resource management, and for documenting changes in public concerns and perceptions. It is generally used in conjunction with the collection of other social data, to enable comparison of media representations with the views of people expressed through mechanisms such as surveys.

**Relevant to:** Those with an interest in how fisheries issues are discussed in the media.

**Output:** Document and understand perceptions and values as reported in the media, and how they may have changed.

**Usefulness:** Allows comparisons of media representations with the views of people expressed through other mechanisms such as surveys.

**Data:** Various media reports.

**Time/cost:** Relatively low.

### 2.2 Qualitative interviews

Qualitative interviews with individuals are a key method for gathering data that help explain human behaviour and perceptions. Gathering qualitative data via interviews enables development of understanding of how and why people have chosen to act in particular ways, whereas quantitative surveys do not enable this type of understanding.

**Relevant to:** Any stakeholder group.

**Output:** Provides an understanding of how and why people act in particular ways.

**Usefulness:** Provides policy makers with information about why certain actions or perceptions occur and allows policy makers to respond to the causes of these actions or perceptions.

**Data:** Qualitative data regarding perceptions and behaviour are collected.

**Time/cost:** Relatively high.

### 2.3 Group interactions: Focus groups, group interviews, workshops

Focus groups, group interviews and workshops are useful ways of gaining a rapid understanding of the views held by a number of people. Similar to qualitative interviews, they are a key method for gathering data that help explain human behaviour and perceptions. Gathering qualitative data via these “group interaction” methods can provide an understanding of how and why people have chosen to act in particular ways. These methods enable interaction between participants and are useful ways to generate new ideas and possible solutions to problems that are acceptable to a range of stakeholders and groups.

**Relevant to:** Any stakeholder group.

**Output:** Provides an understanding of how and why people act in particular ways.

**Usefulness:** Information is collected relatively quickly and provides policy makers with information about why certain actions or perceptions occur and allows policy makers to respond to the causes of these actions or perceptions.

# Social and economic assessment methods – *continued*



**Data:** Qualitative data and information are collected regarding group perceptions and views and factors that influence individuals' behaviours.

**Time/cost:** Medium to high – less expensive than undertaking multiple individual interviews.

## 2.4 Quantitative sample surveys

Quantitative sample surveys are important tools that can be used to understand the proportion of a population that holds a particular view or undertakes a particular action. To be effective, however, they need to be well designed and implemented – quantitative surveys often fail due to a lack of professionalism in their design and implementation, which can easily result in a low response rate to the survey, or data that have limited usefulness. Quantitative surveys are used in many circumstances to gather important social information. They are most commonly used as a tool in social impact assessment, perceptions studies, and increasingly in community consultation processes to ensure that the views of the entire population are known on an issue.

**Relevant to:** Any stakeholder group.

**Output:** Provides an understanding of the proportion of a population that holds particular views or undertakes particular actions.

**Usefulness:** Enable an understanding of the distribution of particular characteristics across a defined population and how widespread different perceptions, behaviours and characteristics are.

**Data:** Quantitative data are collected.

**Time/cost:** Medium to high, depending on which survey method is used.

## 2.5 Analysis of demographic and other statistics

Analysing available statistical data can be a useful tool to help inform managers and policy makers about the social environment in which marine management activities are taking place.

**Relevant to:** Any stakeholder group.

**Output:** The characteristics of particular groups involved in using marine resources, or the communities in which groups such as commercial fishers live.

**Usefulness:** May help identify stakeholder characteristics that fisheries managers need to consider.

**Data:** Secondary data may be used if available. If not, quantitative surveys may be required.

**Time/cost:** Relatively low depending on data availability.

# Social and economic assessment methods – continued

## Source of information

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# Quantitative stock assessment methods

## EAF steps

**Activity 1.3 - Finalise the scoping and background document**

**Activity 3.3 - Management option evaluation and selection**

**Activity 4.3 - Review performance of the management system**

## Purpose

Complete quantitative calculations based on available information to generate estimates of current and/or future stock status for target or bycatch species. These assessments can be required for the EAF planning process by providing background information, completing the risk assessment (prioritisation) process, plus they can be used in the evaluation of different management options.

## Overview

Stock assessments can make use of diverse types of information (generally quantitative) to form a scientific opinion on the historical, current and future stock levels of harvested stocks. This can be used to provide advice about the status of a fishery and its key fish stocks and the possible outcomes of current or proposed management actions. These assessments generally include aspects related to the resource abundance but could also cover other important aspects of fish population dynamics or even economically or socially relevant features. Stock assessment generally involves the use of various statistical and mathematical calculations to make quantitative predictions about the reactions of fish populations to previous, current and future levels of fishing (Hilborn and Walters 1992, 2003).

Fishery managers in both developing and developed countries are usually required to achieve policy goals aimed at sustainable production of fish yields for the benefit of fisher livelihoods, national food security and economic gain. Many different stock assessment models and software packages are available to assist managers in reaching these goals. These tools range from simple techniques for estimating parameters such as growth and mortality rates, to full simulation models of fishery systems allowing interactions between different species, fleets and gear types, and predicting the effects of different management strategies.

The requirements of such tools, particularly the data inputs, vary greatly. Different tools are also applicable to different fisheries, depending on their operational structure, ecology and the intended management strategy. Fishery managers need to select and use appropriate decision-making support tools from the wide range of possible choices, bearing in mind their capacity to collect the necessary data and their ability to use the models and implement the management guidance produced.

Finding the best tool, however, can be hampered by the diversity of choices available and the difficulty of comparing the costs (input requirements) and benefits (type and precision of management advice) of each tool. Essentially, stock assessment methods require their own specific toolbox. For instance, NOAA have developed a Fisheries Toolbox that outlines most of the quantitative methods that they are using in the United States for fisheries stock assessment.



# Quantitative stock assessment methods – continued

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## Other relevant references

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Hilborn, R. & Walters, C.J. 2003. *Quantitative fisheries stock assessment: choice, dynamics and uncertainty*. New York, Chapman and Hall, 570 pp.

# GIS based tools for data synthesis and analysis

## EAF steps

**Activity 1.3 - Finalise the scoping and background document**

**Activity 3.3 - Management option evaluation and selection**

## Purpose

- Assist in data synthesis for spatially-based data.
- Assist in the evaluation of spatially based management options to help determine the best option to meet an objective.
- Assessment of impact on other issues and other objectives.
- Assist the adjustment of the options to minimize unwanted interactions and maximize synergy between options.

## Overview

The Ecosystem-Based Management (EBM) tools Web site has a broad range of GIS packages that can be used to help assess spatially based management options, especially those where different boundaries or zonation schemes may be involved. The EBM tools Web site has a search engine that assists in the selection of packages based on category of use and purchase cost.

## EAF tool tips

Each of the GIS packages has a short description within the EBM tools Web site that should help determine which (if any) are applicable to your circumstances.

## Source of information

The Ecosystem-Based Management (EBM) Tools Network: [www.ebmtools.org/](http://www.ebmtools.org/)



Photo: S. Garcia/FAO



# EAF component trees

## EAF steps

### Activity 2.1 - Asset and issue identification

#### Purpose

Component trees assist with the orderly identification of issues (components) of a fishery system by providing a standardised starting point and a framework to structure components in a consistent and hierarchical manner. The outputs that are developed using component trees also assist with the prioritisation process and the development of efficient management strategies.

#### Overview

The component tree approach consists of modifying a set of “generic component trees” to document and structure the various issues associated with a fishery system into their related groups (ecological assets, human wellbeing [social and economic outcomes], governance systems and external drivers) in a hierarchical manner. This process minimizes the chance of missing issues. The hierarchical structure greatly assists in the determination of the overall priority and the level at which the development of efficient management strategies might best be undertaken.

The system has one generic component tree for each of the main components of EAF, e.g. target species, bycatch species, ecosystem, social/economic wellbeing and governance. The components in the generic trees represent the more common types of issues that have been previously recognized to be relevant and are therefore useful as starting points. Stakeholders then tailor each of these trees to suit the particular circumstances of their fishery, which can include splitting some of the components if greater detail is needed, adding components, or removing those that are not relevant. The number and type of issues identified will depend upon the fishing methods used, the areas of operation, the species involved, the types of communities where the fishery operates and the governance model. It is important, however, to remember that merely having no or little direct information is NOT a sufficient reason to ignore a potential issue that may require management in the future. There is a tendency in the workshops to identify issues in a very high degree of detail, given the hierarchical nature of the component tree structure; the outcomes of the subsequent risk analysis generally result in any unnecessary components being consolidated to an appropriate level of detail. Ultimately it comes down to what is the unit that is being (or can be) managed. The full set of generic trees for each of the EAF components is provided below.

#### EAF tool tips

**When is it good?** – These methods work very well when the venue and computer equipment are adequate and the stakeholders are reasonably familiar with EAF concepts and have an understanding of the technical nature of using organizational charts. It is a good method to use when time is limited because it simultaneously identifies and sorts the issues and because it will minimize missing issues.

**When is it not so good?** – In situations where there is minimal technical support and/or the participants are not very familiar with the EAF approach and may be intimidated by this technical approach. It is not good where the participants are likely to be very impatient and aggressive in wanting to get their issues and problems out quickly, or they don't want to be “lead” by the facilitator/agency.

## EAF component trees – *continued*

For the first problem, the use of checklists (See EAF Component Lists fact sheet) can assist if there is just a problem of minimal technical support. Brainstorming (see Brainstorming fact sheet) is often a better way of rapidly engaging participants, especially those suspicious of the process. These issues can then be sorted into the EAF categories, and potentially put into the component tree structure in between sessions, as a reporting tool.

### General tips

Input can be achieved through a series of workshops that may begin with just the key managers and any scientific advisers, and progressively involve stakeholders (e.g. key industry representatives) and finally open forums. Alternatively, the workshop(s) may involve all stakeholders from the outset to save time and have a more integrated process, but this can limit the number of stakeholders who actively engage and can also be hard to manage.

The purpose of these workshops is to identify and structure ALL the issues that stakeholders identify, not their prioritisation. Even if a stakeholder raises an issue known to be wrong, describing what is NOT important can be valuable and participants will also feel their views have been heard.

The stakeholders must already have a basic understanding of EAF principles so a preparatory meeting (or pre-meeting session) will help.

It is useful to list any identified threats or impact types of issues under the specific asset or outcome component that they may be affecting (see retained species example in Figure 1). This assists with the completion of the risk assessment process.

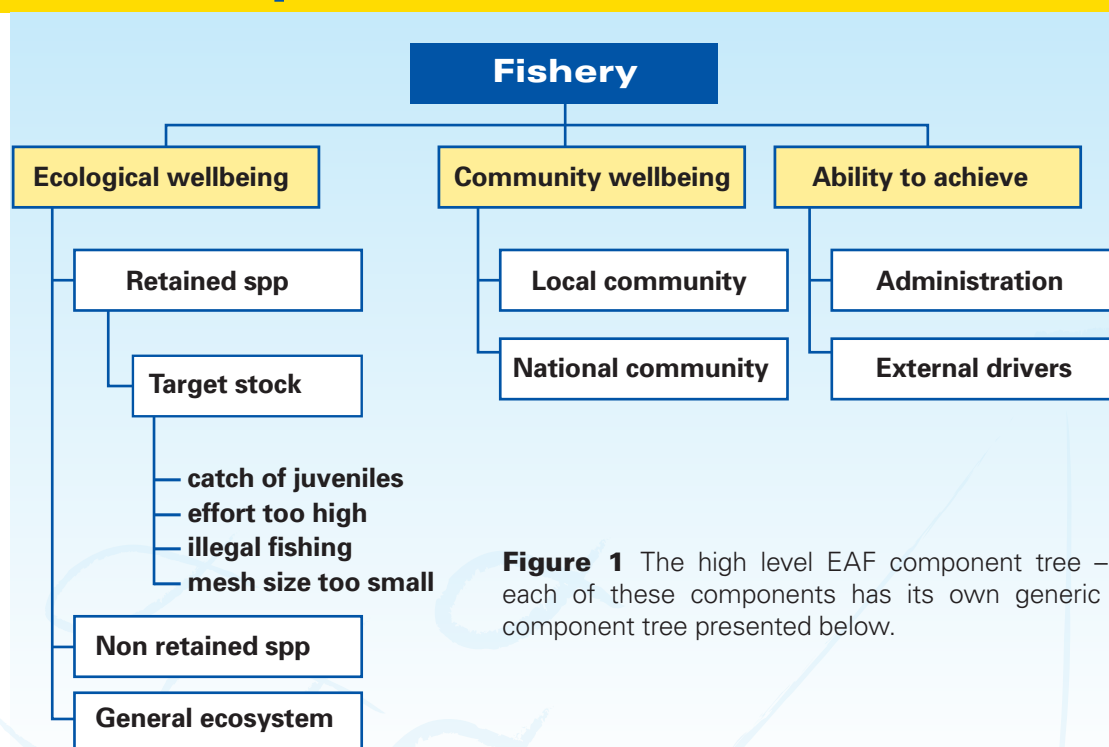
The trees work well in situations where there is access to computer projectors and the audience is not intimidated by such technology. The computerised version of the component trees may not be appropriate when trying to obtain input from fishers in remote or artisanal fisheries. In many cases it may be impractical to use technology in these locations; the checklists can then be used.

Removing clearly irrelevant issues and adding a few well known and relevant issues prior to the initial presentation to stakeholders can minimize the negative reactions of the audience. But do not have the trees virtually completed beforehand, because there must be “ownership” of the component trees by the stakeholders, and therefore they should not be imposed.

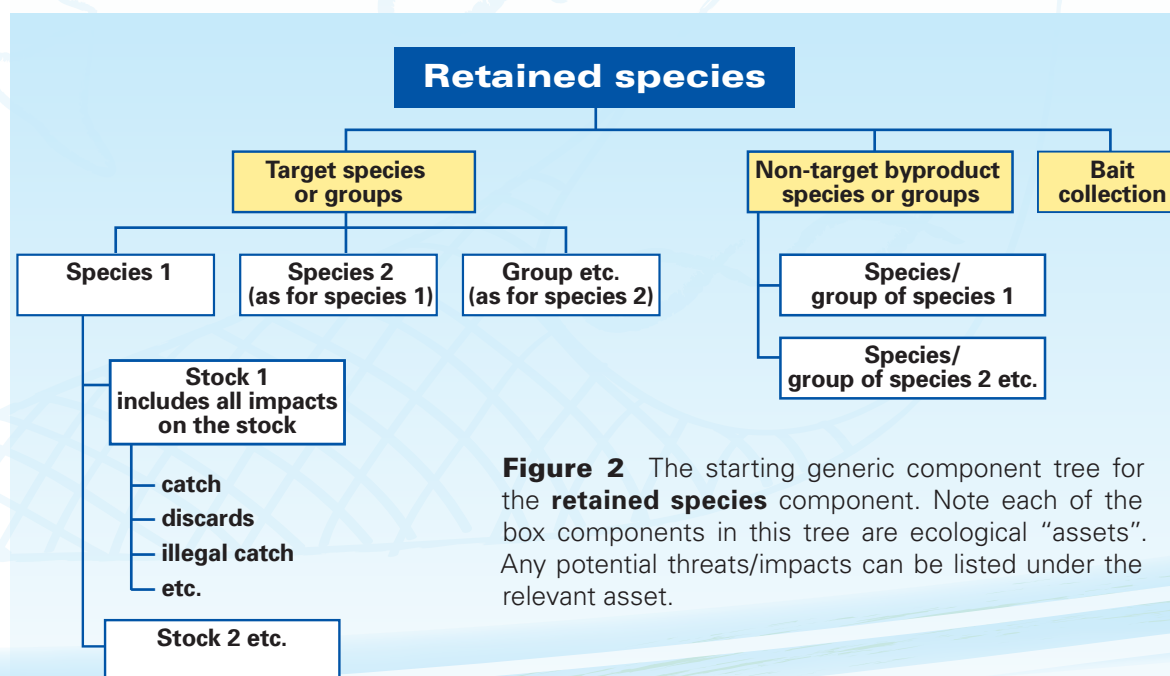
Workshops must be run in the language that participants are confident in so that they might easily express themselves.



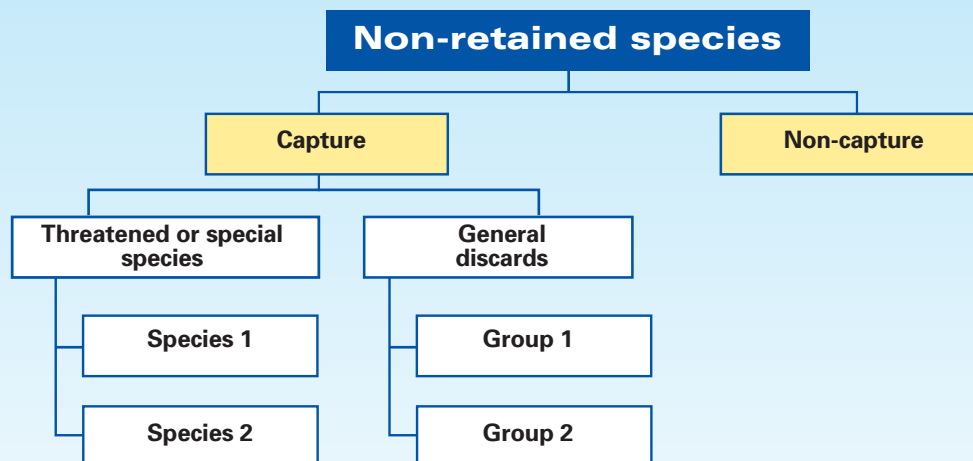
# EAF component trees – *continued*



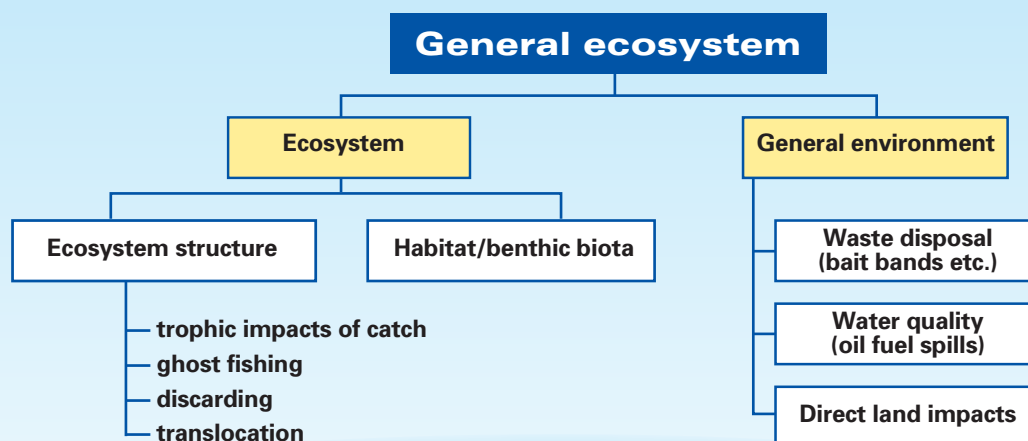
**Figure 1** The high level EAF component tree – each of these components has its own generic component tree presented below.



**Figure 2** The starting generic component tree for the **retained species** component. Note each of the box components in this tree are ecological “assets”. Any potential threats/impacts can be listed under the relevant asset.

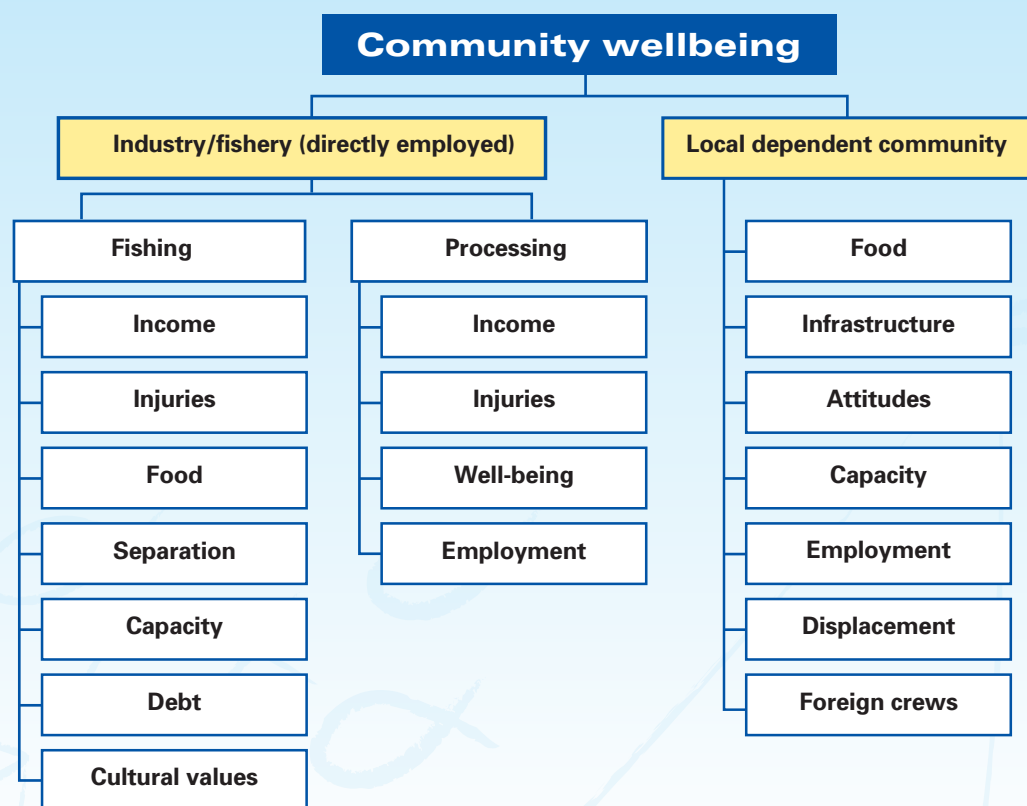


**Figure 3** The starting generic component tree for **non - retained/ discard species**. Note each of the components in this tree are ecological “assets”. They can often be groups rather than just species.

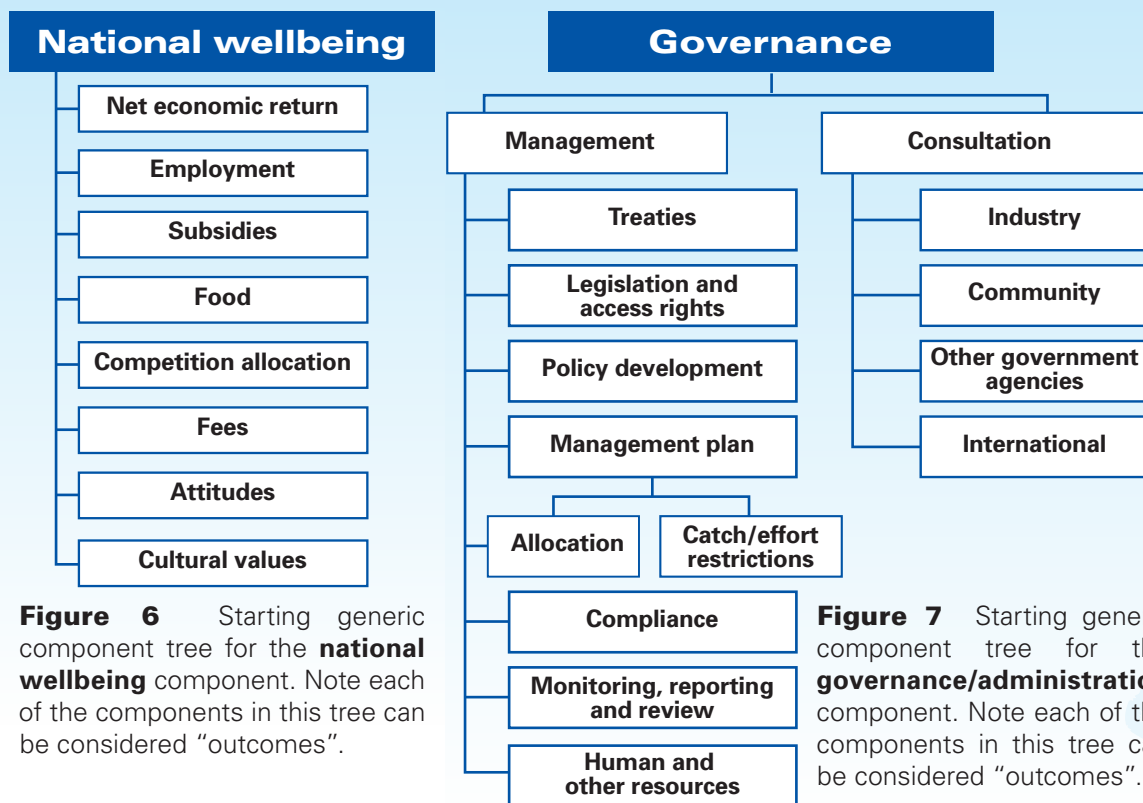


**Figure 4** Starting generic component tree for the **general ecosystem**. The two main components in the ecosystem structure branch are the ecological assets, with some of the possible impacts on these assets listed.

## EAF component trees – *continued*

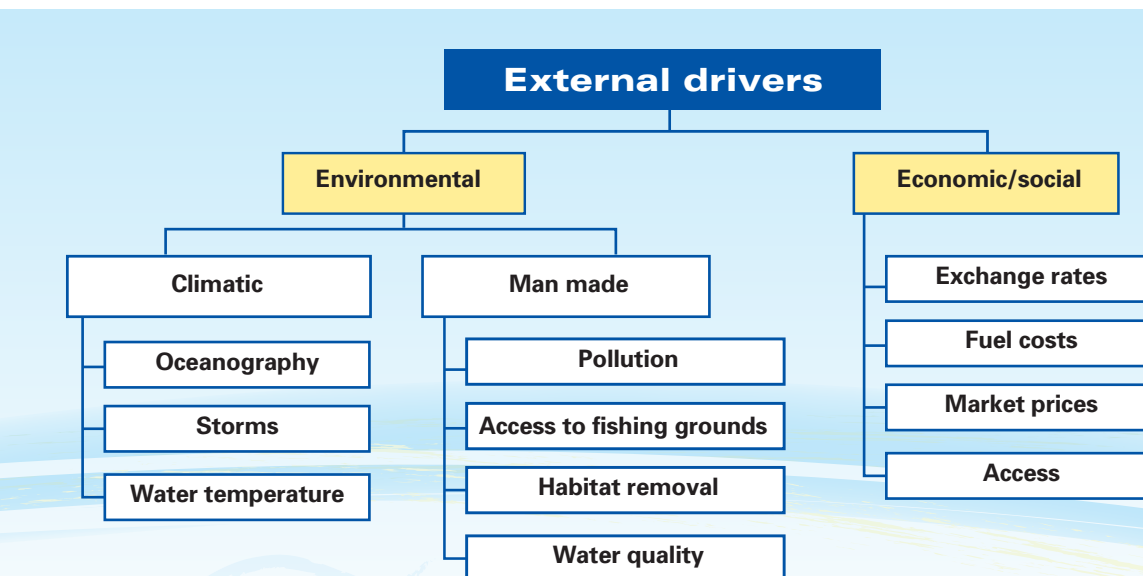


**Figure 5** Starting generic component tree for the **community wellbeing** component. Note each of the components in this tree can be considered community “outcomes”.



**Figure 6** Starting generic component tree for the **national wellbeing** component. Note each of the components in this tree can be considered “outcomes”.

**Figure 7** Starting generic component tree for the **governance/administration** component. Note each of the components in this tree can be considered “outcomes”.



**Figure 8** Starting generic component tree for the **External driver** component. Note each of the components in this tree can be considered “drivers”.



## EAF component trees – continued

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# EAF component lists

## EAF steps

### Activity 2.1 - Asset and issue identification

#### Purpose

EAF component lists can be used to assist with the orderly identification of issues for a fishery by providing a standardised starting point and a simple framework that prompts discussion on what issues may be relevant to the fishery for each of the EAF components in a consistent and hierarchical manner.

#### Overview

The component list approach uses the same set of starting points/generic issues as the component tree approach, but it uses a set of lists rather than the component trees to display the identified issues. This means it is technically much simpler to use as it doesn't require access to computers or projectors.

The starting lists consist of the set of issues that are often identified for fisheries that have been sorted into their related groups (ecological assets, human wellbeing [social and economic outcomes], governance systems and external drivers) in a hierarchical manner. Because there are already a number of suggestions in this list, this process minimizes the chance of missing issues. The structure of the lists greatly assists in determining the overall priority and level at which the development of efficient management strategies might best be undertaken.

The process begins with participants (usually at an issue identification workshop or meeting) going through each of the EAF category lists and adding or refining any additional issues that are relevant for the fishery but were not present in the starting lists and removing any of the starting issues that are definitely NOT relevant to their fishery. It is important to remember that merely having no or little direct information is NOT a sufficient reason to ignore a potential issue that may require management in the future. There is a tendency in the workshops to identify issues in a very high degree of detail, given the hierarchical nature of the component list structure; the outcomes of the subsequent risk analysis generally result in any unnecessary issues being consolidated to an appropriate level of detail.

The lists and a set of worksheets that can be used in the workshops to help participants through the process are described in this fact sheet.

#### EAF tool tips

**When is it good?** In situations where there is minimal technical support and/or the participants are not very familiar with the EAF approach and may be intimidated by the use of component trees. It is also good where the method of identification involves the use of a small sub-group. It is much easier to collate a set of lists than to collate a set of component trees.

**When is it not so good?** When working with a large group and there is access to computers and computer projectors. The tree approach is much more visual and therefore often better in these circumstances.

**General tips:** Workshops or meetings must be run in the language that participants are able to easily express themselves in. Therefore, the lists need to be translated into whichever language is to be used in the issues identification workshop. If multiple languages are involved, they may need to be translated into all of these languages.

A table with examples of generic component lists is provided next.

# EAF component lists – *continued*

## Generic component lists

The list reflects the categories represented in the tool “Generic component trees”.

Key EAF Components	Category	Component/issue	Threats - impacts
<b>Ecological wellbeing</b>			
<b>Retained species</b>	Target species	Species/ stock 1 (e.g. shrimp species 1)	e.g. catches too high, effort levels, illegal fishing, catches of juveniles,
		Species 2 (e.g. shrimp species 2) etc.	
	Bycatch species/groups	Species/ group 1 (e.g. crabs)	e.g. catches too high, effort levels for this more vulnerable species
		Group 2 etc.	
<b>Discarded species</b>	Direct capture	Species/ group 1 (protected or threatened) e.g. dolphins, seabirds	e.g. capture rates too high – increase in public concern
		Species / group 2 (not protected or threatened) e.g. trash fish	e.g. too much trash fish increases sorting time, etc.
	Interaction with the gear	Species / group 1 (e.g. whales)	tangled in ropes
<b>General Ecosystem</b>	Impacts of fishing on ecosystem structure	Community structure (trophic impacts)	e.g. capture levels of key species too high, discarding levels too high
		Ghost Fishing	e.g. habitat damage, trawl damage
		Translocation	e.g. transporting invasive species on hulls
	Other impacts of fishing	Waste disposal	e.g. loss of bait bands
	Impacts on water quality		e.g. oil spills from vessels
<b>Social and economic wellbeing</b>			
<b>Community wellbeing</b>	Industry – fishing (directly employed)	Income	e.g. market prices too low
		Injuries	e.g. too many injuries
		Food	e.g. part of catch is important for feeding fisher families
		Conflicts	e.g. too much effort leading to disputes
		Employment	e.g. fishing is a high employer of locals
		Distribution	e.g. a few fishers have most of the access
		Cultural values (including social capital)	e.g. historic fishing methods have a high cultural value that are under threat
	Industry – processing	Income	e.g. wages too high; markets variable
		Injuries	
		Employment	
	Local dependent communities	Food	e.g. increased export of product reducing local availability and prices
		Employment	e.g. fishing is a high employer of locals
		Cultural values	e.g. increased foreign crews changing local culture

# EAF component lists – continued



Key EAF components	Category	Component/ issue	Threats - impacts
National wellbeing	Economic	Net economic return	
		Subsidies	e.g high subsidies are increasing effort levels
		Fees	e.g. high fees for foreign vessels are important to GDP
	Social	Employment	e.g. increased export of product reducing local availability and prices
		Food	e.g. fishing is a high employer of locals
		Cultural values	e.g. increased foreign crews changing local culture
Ability to achieve			
Governance	Management	Treaties	e.g. meeting international obligations
		Legislation	e.g. old legislation needs updating
		Management plan/ policy development	e.g. lack of a plan
	Allocation	Catch/effort restrictions	e.g. no limited access arrangements
		Compliance	e.g. lack of enforcement staff
		Monitoring and review	e.g. no monitoring system in place
		Human and other resources	e.g. too few resources to undertake necessary activities
	Consultation	Industry	e.g. Industry has no collective voice
		Community	e.g. no mechanism for community to input
		Other government agencies	e.g. lack of linkages with other agencies
		International	
	External drivers	Environmental	Oceanography
Pollution/ water quality			e.g. nursery areas being affected by coastal runoff
Access to fishing grounds			e.g. marine protected area reducing normal fishing areas
Habitat removal			e.g. mangroves being removed for housing development
Economic/social		Exchange rates	e.g. exchange rate variations affect profits
		Fuel costs	e.g. increased fuel cost affects profits
		Market prices	e.g. drop in market price affects profits



## EAF component lists – *continued*

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# Asset/objective – impact/threat matrix

## EAF steps

**Activity 2.1 - Asset and issue identification**

**Activity 2.2 - Issue prioritisation and risk assessment**

**Activity 3.3 - Management option evaluation and selection**

## Purpose

To efficiently separate identified issues into their two different categories – an issue can either describe what we want to achieve (e.g. a healthy biomass of the target species), or an issue can describe a threat or impact to what we want to achieve (e.g. too much effort, catch of undersized fish). This tool can also be used to assist in the assessment of cumulative impacts generated by multiple issues and identify where one impact affects multiple outcomes. This helps determine what should be the most urgent management actions.

## Overview

### Sorting identified issues

When identifying issues, especially when this involves some form of stakeholder consultation or input, the issues raised will generally include a combination of the outcomes or objectives that are desired for the resources/assets being managed (e.g. target species abundance, ecosystem health); the social and economic outcomes (food security, economic rent); and issues that are the threats, impacts and drivers on these assets and outcomes (e.g. overfishing, too much effort, small mesh size, price of fuel) and will affect whether the objectives will be achieved or not. This reflects the interactive nature of fisheries management whereby the outcomes and objectives can be impacted by numerous drivers.

One of the main difficulties that can arise during the risk assessment process that follows the application of issue identification tools (including component trees but particularly when using brainstorming approaches) is whether the correct issue is being assessed. Are you assessing the risks to an asset/resource achieving its objective (e.g. the stock level of a target species) or are you assessing the risk of/from a threat/ impact (e.g. too much effort)? It is therefore very useful to clearly identify whether an issue is an asset/objective issue or if it is a threat/impact issue. This can be assisted by using the Table/List structure provided in Appendix 1.

### Assisting risk assessments

The risks to achieving the objectives (such as ensuring the stock status is maintained at appropriate levels) are affected by threats, impacts and opportunities, with the overall risk to an asset or outcome essentially being the sum of all the specific impacts. By explicitly documenting the list of impacts or threats that are (or could be) affecting each of the assets, this separation helps with the risk assessment process. This distinction recognizes that each of the individual threats and impacts may not in isolation generate an unacceptable risk, but collectively they could be generating a high risk for the asset/outcome.

For example, illegal fishing is often raised as an issue. This issue generates an impact on the status of one or more retained species (asset) and hence is one of the impacts/threats that could be affecting whether the objectives for the asset (e.g. stock sustainability) will be achieved. Similarly, the capture of juveniles, including their discarding, is not an element that should be assessed as a non-retained species issue; this impact should be included in the overall assessment of impacts on stock status.



## Asset/objective – impact/threat matrix – *continued*

A risk assessment for target species should be done at the stock level which should include all of the impacts that are affecting the stock, including threats such as illegal fishing and the capture of juveniles. It is useful to record each of these threats as potential sources of impact on the status of the relevant retained species when completing the risk assessment, using either a yes/no or some relative impact score (low, medium, high) representing a consensus view of the relative level that each impact/driver contributes to the overall risk level for the asset/outcome (see Appendix 1).

### **Management option development**

To better reflect the interactive nature of assets, outcomes, drivers and impacts, the assessments of each asset/outcome can be inserted into a two-dimensional matrix which has been developed to use as a starting template to enable all the different types of issues to be consolidated into a single table (see Appendix 2 for illustrative example). The advantage is that the matrix clearly shows the direct links between the status of each of the specific assets and outcomes, with the impacts, threats and opportunities that may be affecting them.

The method works by combining each of the sets of information generated by the individual risk assessments into the matrix. Thus the columns are all the identified ecological assets and social/economic outcomes and the rows are the entire list of identified threats/impacts that have been recorded against one or more of these assets/ outcomes.

The simple version for using this method would be to merely indicate that an impact does or does not affect each specific asset or outcome. A more complex method would also include some relative measure of the severity (i.e. nil, low, moderate, high) of this impact. Using each of these individual scores, the matrix can be used to help assess the overall level of significance for each type of impact across the entire fishery system. This should assist with the determination of which impacts and threats may be the most important to deal with and therefore assist in determining the most cost effective and appropriate management options. For example if the level of effort is not only causing risks to the target stocks, but also to a number of bycatch species, habitat and economic outcomes then this may be the most urgent problem to fix, because it would help to meet multiple objectives.

### **EAF tool tips**

When stakeholders identify an “impact type” of issue, ensure they are specific about which asset or assets and outcomes will be, or are already, being affected by this type of issue.

# Asset/objective – impact/threat matrix – continued



## Appendix 1

### Asset – impact list

#### For the contributing impacts/threats –

Assign a relative level of contributing impact on the asset by each threat/impact using scale of:

**0** (nil)

**1** (little)

**2** (some)

**3** (considerable)

–, –, ---

for three levels of  
negative impacts; and

+, ++, +++

for positive impacts;  
or just use

**Yes, or No**

Add any missing threats and remove any irrelevant threats.

Name of asset/outcome:			
<b>Objectives:</b> What are the objectives for this asset? There may only be one objective.	<b>Objective</b>	<b>Objective</b>	<b>Objective</b>
<b>Overall risk level</b> for each objective (Negligible–High). Should reflect the “sum” of the individual impacts below.	<b>Risk level</b>	<b>Risk level</b>	<b>Risk level</b>
<b>Contributing impacts/ threats</b>			
<b>Fishing activities/governance system</b>			
Effort/catch level			
Gear size			
Catch of undersize/juveniles			
Gear type			
Area of operation			
Illegal fishing			
Management plan implementation			
Add all other relevant identified impacts			
<b>External drivers</b>			
Fuel price			
Cost of labour			
Pollution			
Climate			
Political will			
Add others where needed			



# Asset/objective – impact/threat matrix – *continued*

## Appendix 2

**Objective-impact matrix:** the columns are the list of assets and outcomes for the fishery system as identified previously and the rows are the full set of impacts/threats or opportunities that may affect the fishery. The matrix should be built up by adding the set of information generated from each individual risk assessment using the lists from Appendix 1. The table below is for illustrative purposes and is not meant to be a comprehensive set of all possible rows and columns. The overall level of significance for each impact can be inferred qualitatively from the individual scores or used as a starting point for a more formal multi-criteria analysis (see also Multi-criteria fact sheet).

Asset/ outcome		Retained species – target	Retained species – by product	Habitat	Ecosystem	Protected species	Economic outcomes industry	Social outcomes industry	Community outcomes	Level of overall significance (Low–High)*
Overall relative risk level										
<b>Impacts/ threats</b>										
<b>Fishing activities/ system</b>	Effort/ catch level									
	Gear size									
	Gear type									
	Area of operation									
	Illegal fishing									
	Management plans									
<b>External drivers</b>	Fuel price									
	Cost of labour									
	Pollution									
	Climate									
	Political will									

\* Should help to determine where action is best taken



# Non formal risk categories (preliminary hazard analysis)

## EAF steps

### Activity 2.2 - Issue prioritisation and risk assessment

#### Purpose

To determine relative risk levels of issues where a higher level of direct involvement by stakeholders is wanted but the levels of formal training of this group and/or the levels of quantitative data and even qualitative information are low.

#### Overview

In situations where there is little formal/quantitative knowledge, or where the participants would not be confident using more sophisticated risk assessment techniques (which is often the case for community consultation processes), the use of a simple three category risk prioritisation process can be an appropriate and effective method. Such methods can generate outcomes that are consistent with more formal risk assessment techniques such as preliminary hazard analyses (IEC, 2009).

In these circumstances, rather than trying to use a formal qualitative risk assessment process (e.g. Consequence x Likelihood), the risk associated with each issue can be directly assigned by the participants to one of three categories – High, Medium or Low Risk with the descriptions incorporating both the consequence and likelihood.

For some issues, the outcomes from this method may be seen as preliminary because they can complement other more formal methods where it is critical to get wide stakeholder involvement. For other issues, where there are few formal data, this may be the more robust system to use. If a high level risk is identified by this method it will often lead to actions that include the collection of more information to enable subsequent assessments and the determination of risk levels in a more robust fashion.

#### EAF tool tips

**When is it good?** This method works well in EAF planning especially when working with stakeholders who have had minimal EAF training, or when language skills and formal education will make formal methods difficult to grasp in the time available. The methods may be more robust than trying to use formal assessment methods when there are insufficient data, or the audience is not in a position to apply them appropriately (for whatever reason). They are often the most robust and efficient methods for assessing social or ideologically-driven issues. These issues/objectives are hard to categorize into levels because they include many perception based social issues and there is minimal quantitative information available on which to base precise judgements.

**When is it not so good?** It does not work as well in situations where more data are available and the assessment team is able to use more formal methods. Similarly, if stakeholders are expecting or wanting a more formal system and they would not accept the outcomes of this simplified approach, then the more formal methods may be better, as long as they are capable of being used appropriately.

It doesn't work well when stakeholders want to rate all issues as "high" because there is uncertainty associated with the lack of formal data. If this happens, then it may be best to use the "sticky dot method" as this should result in at least some level of prioritisation and separation of the issues.

# Non formal risk categories (preliminary hazard analysis) – *continued*

## a. Non formal risk category system

### How does it work?

In situations where there is little formal/quantitative knowledge, or where the participants would not be confident using more sophisticated techniques (which is often the case for community consultation processes), a simple three level prioritisation process can be the most appropriate and effective method to use.

The risk associated with each issue is assigned to one of three categories – High, Medium or Low. If it is essentially insignificant or impossible, then just say so and don't include it in the final list.

Low – Either the level of impact on the objective is expected to be low, or the chances of a major impact are extremely small. So, you are highly likely to achieve your objective even without direct management action being applied.

Medium – It is currently at an acceptable level but unless direct actions are undertaken then the objectives will not continue to be met to a satisfactory level; or the reason the objectives are currently being met is because there are direct management actions currently operating; these need to be maintained.

High – The issue is already at a point where severe problems are known to be occurring or this is very likely to happen in the near future. If there is already management it is not working to a sufficient level. Objectives will not be met unless additional actions are taken.

**Table 1 Risk levels, categories, scores and outcomes**

Risk level	Risk categories	Risk scores (C x L)*	Likely management response	Likely reporting requirements
Negligible	1	1–2	None	Brief justification
Low		3–4	No specific management	Full justification needed
Medium	2	6–8	Specific management/monitoring needed	Full performance report
High	3	9–16	Increased management activities needed	Full performance report

**\*Risk scores (C x L) are equivalent risk scores of a qualitative risk analysis.**

## b. Formal risk assessment

The table below outlines what can be used to describe how the levels of impact can be divided into different levels of consequence. An important aspect to note is that the consequence levels are based on what is acceptable to meet as an objective, not some linear or other standard division of the degree of impact.

Consequence level	Description
1. Minor	Minimal impacts that are acceptable with no impact on meeting objective
2. Moderate	Maximum acceptable level of impacts while still meeting objective
3. Major	Above acceptable limit. Wide and long-term negative impacts and the objective is not being met
4. Extreme	Well above acceptable limit. Very serious, likely to require long restoration time to undo with the objective not being met by a considerable margin

# Non formal risk categories (preliminary hazard analysis) – continued

Likelihood definitions – these are usually defined for the likelihood of a particular consequence level actually occurring within whatever is the assessment period.

Likelihood level	Description
1. Remote	The consequence has never been heard of in these circumstances, but it is not impossible within the time frame - < 2%
2. Unlikely	The consequence is not expected to occur in the timeframe but it has been known to occur elsewhere under special circumstances (2–10%)
3. Possible	The consequence level may occur but this is still not likely in the time frame. (10–40%)
4. Likely	The particular consequence level is expected to occur in the timeframe ( > 40%)

**Risk Matrix** – numbers in cells indicate risk value, the colours/shades indicate risk rankings (see Table 1 for descriptions)

		Consequence level			
		Minor	Moderate	Major	Extreme
Likelihood levels		1	2	3	4
Remote	1	1	2	3	4
Unlikely	2	2	4	6	8
Possible	3	3	6	9	12
Likely	4	4	8	12	16

In making the decisions about which are the most appropriate combinations of consequence and likelihood, the assessors should try and estimate the scale of impact that is currently occurring (or will occur) compared with what would be needed to generate a certain level of consequence or outcome. If more than one combination of Consequence and Likelihood is considered plausible, the combination with the highest risk score (values are between 1–16) should be chosen.

**Risk = potential that a chosen action or activity (including the choice of inaction) will lead to a loss (an undesirable outcome).**

**Risk assessment ascertains how big this potential is:**

**Risk value = Consequence (impact) x Likelihood**

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# Qualitative risk analysis (Consequence x Likelihood)

## EAF steps

### Activity 2.2 - Issue prioritisation and risk assessment

#### Purpose

To qualitatively assess the risks of each of the identified EAF components (i.e. target stocks, bycatch, habitat, ecosystems, social, economic and governance) to determine their relative priority for direct management or other actions. This approach is a formalized system which enables the assessment of risks where insufficient information is available for fully quantitative methods.

#### Overview

Most robust prioritisation processes are based on risk assessment principles because these involve assessing the uncertainty in achieving your objectives. This is because risk is defined as “the impact of uncertainty on achieving objectives” (ISO, 2009). All risk assessments essentially involve the calculation of the magnitude of potential consequences and the likelihood that each of these consequences will occur; these scores are combined to generate a risk level (Scandol *et al.*, 2009). Essentially, the higher the probability that a “worse” consequence may actually occur, the greater is the level of risk.

Qualitative risk assessments use words rather than numbers to describe the magnitude of potential consequences and the probability (likelihood) that those consequences will occur (HB 436, 2004). The Consequence x Likelihood (CxL) matrix method therefore combines the scores from the qualitative or semi-quantitative ratings of consequence (levels of impact) and the likelihood (levels of probability) that a specific consequence will occur (not just any consequence) to generate a risk score and risk rating (IEC/ISO 301010, 2009). Other qualitative risk methods are available and these are described separately.

**How does it work?** This C x L risk assessment process involves selecting the most appropriate combination of consequence and likelihood levels that fit the situation for a particular objective, based upon the information available and the collective wisdom of the group (including stakeholders) involved in the assessment process. These scores are multiplied to generate an overall risk score.

**4 x 4 Risk matrix** – numbers in cells indicate risk value, the colours/shades indicate risk rankings (see below for descriptions).

		Consequence level			
		Minor	Moderate	Major	Extreme
Likelihood Levels		1	2	3	4
Remote	1	1	2	3	4
Unlikely	2	2	4	6	8
Possible	3	3	6	9	12
Likely	4	4	8	12	16

# Qualitative risk analysis (Consequence x Likelihood) – *continued*

Using the risk matrix, if the assessment group concludes that the most appropriate combination for an assessment of a particular objective is that *it is possible that a major consequence could occur*, this is a consequence level 3 and a likelihood level 3. These two scores are multiplied to generate a risk score of 9 which for this system would equate to a high risk (see risk levels and outcomes below). This is an unacceptable level of risk and therefore increased management actions would be needed to achieve the objective.

To correctly assign the levels of consequence and likelihood, it is important to recognize that these form a pair; they are not to be chosen independently. It is the likelihood that, given a particular fishing management strategy, a particular level of impact may be the result (either from an accumulation of small events or from a single large event). **It is assessing the likelihood of an outcome being generated not the likelihood of an activity occurring.** This type of error must be avoided as it results in over-rating risks.

When making decisions about what are appropriate combinations of consequence and likelihood, if more than one combination of consequence and likelihood is considered plausible, the combination with the highest risk score should be chosen (this is consistent with taking a precautionary approach).

Whichever final combination of consequence and likelihood is chosen, it is very important that the justifications for choosing this combination of levels are recorded. Other parties who were not part of the assessment process may need to be able to see the logic and assumptions behind the decisions. It also greatly assists the review of the risk in the future if you know why the levels were originally chosen.

Each of the consequence tables needs to have descriptions of the levels of consequence – if using a four-category system this could be minor, moderate, major, or extreme; the moderate level should always describe the [maximum acceptable level of impact](#).

Determining the acceptable level of impact is a very important part of the risk assessment (and management) process because it defines how the process operates. The descriptions for each of these levels provided in the Appendix tables have been developed based on experiences gained across multiple fisheries; however, they can be changed to suit local circumstances. Given that a level of impact in one circumstance may be acceptable, but not in others, the description of which level of impact is ascribed to which level of consequence can also vary. So, for example, the same level of impact could be considered a moderate consequence for one objective but a high consequence for another.

A table outlining the four levels of likelihood from remote to likely in both words and probability ranges is also included in the Appendix.

The starting set of consequence tables based on the 4 x 4 matrix system is provided in the Appendix but they can be adjusted for local purposes. These cover the most common types of fishery-related objectives including:

- Target stock objectives - stock sustainability (spawning biomass), MSY, MEY
- Ecosystem sustainability (trophic impacts); habitat sustainability (habitat damage), protected species (incorporating social acceptability aspects)
- Economic objectives - economic returns, MEY
- Social objectives - food security, social attitudes, MSY
- Governance - political

# Qualitative risk analysis (Consequence x Likelihood) – *continued*

## Risk levels and outcomes for a 4 x 4 matrix

Risk levels	Risk scores	Likely management response	Likely reporting requirements
Negligible	0–2	None	Brief justification
Low	3–4	No specific management	Full justification needed
Medium	6–8	Specific management/ monitoring needed	Full performance report
High	9–16	Increased management activities needed	Full performance report

## EAF tool tips

**When is it good?** This method works well in EAF planning when there is some level of quantitative information and/or a good level of qualitative information available on which to base judgements. Potential consequences should also be reasonably well understood so that they can be easily structured into different levels with clear written descriptions.

The advantage of this C × L risk assessment system is that it can be used to assess the risk to any fishery related objective including ecological, social, economic, political and occupational. In addition to the set of consequence tables provided in the Appendix, consequence tables can be user-defined and can therefore be modified or developed to suit the particular objectives and acceptability associated with any objective in that location. This is most important for the objectives related to non-target species and especially iconic species, for which the acceptable levels of impact can vary greatly between countries and regions.

The four-category system outlined above and now used in the Pacific and Africa is much simpler to use than the original six-category system. The number of categories can, however, be easily varied to the most appropriate level of detail for the situation. However, more categories can increase disputes in choosing the levels unless the descriptions are very precise and clear, and the additional resolution is warranted. Using more categories may increase the difficulty of assessments without materially affecting the outcome. The descriptions of the different levels in each of the tables can be modified to address local circumstances and new tables can be developed for new objectives.

**When is it not so good?** It does not work well with stakeholders who have had minimal training or when language skills and formal education make this a difficult concept to grasp. It also does not work well with specific issues/objectives that are hard to categorise into levels (which includes many perception-based social issues). In these situations the simpler non-formal or category based methods will be better options. It works badly when the facilitator doesn't understand the concepts and allows the process to generate spurious combinations. It can also fail where individuals participating have preconceived ideas about what they think are the risk levels (this can be both low and high). In such cases outcomes could be improved through the use of a panel rather than open forums.

## General tips for use

- An experienced facilitator is required to make this system work efficiently. The facilitator needs to understand the basis of risk assessment, how this method operates and must be aware of how the descriptions in each of the tables are defined to assist the group make good decisions about the most appropriate C × L combinations.

# Qualitative risk analysis (Consequence x Likelihood) – *continued*



- It is essential to have a training session with all participants before they begin the formal assessment process if they are to participate effectively.
- Ensure participants actually read out loud the FULL descriptions of both consequence and likelihood together when they propose a suitable combination - not just the category levels. It is common for people to unconsciously reinterpret the levels based on the outcome they want.
- The discussion process that assigns risk levels needs to be undertaken using a language that the participants are very familiar with. The process can be confusing enough without adding language inconsistencies. Therefore all the supporting material needs to be in the language that will be used.
- Get up-front agreement on the levels and descriptions for each table. These should be sufficiently unambiguous - especially the maximum level of impact that is considered acceptable.
- It is vital to ensure that when choosing the combination of consequence and likelihood the selected likelihood score relates to the likelihood of a particular consequence level actually occurring, NOT just the likelihood of the activity/event/management occurring. This is an extremely common error to make.
- When defining levels of consequence, it is important not to use language that is associated with uncertainty. For example don't say, "a stock is probably above BMSY", as this will cause confusion between the specification of consequence and likelihood. Consequence statements should be worded as propositions that can have a formal likelihood associated with them.
- It is NOT necessary to have full certainty for issues to rate the risk, nor does uncertainty automatically generate a high risk. The level of uncertainty is only a component of the risk calculation process. Risk assessment is therefore making the MOST informed decision you can that includes uncertainty. Not assessing the risk for an issue because there is a lack of information essentially means that the current actions are rated as being acceptable.
- The combination of consequence and likelihood chosen should be based on the risk of something happening within a defined time period - not the risk of it happening at any point in the future. A convenient time frame to use is the timeframe of the management plan - which is usually around five years.
- A large discrepancy in scores between individuals often reflects that they are really assessing different issues, have different ideas of acceptability or have different knowledge bases. Be sure they are really using the right table. Don't assess the risks to a "protected" species, which has high social value and therefore a low acceptable level impact using the target species table. Alternatively, ensure that participants are using the descriptions for the levels, not creating their own interpretation of what the levels should be.
- Most ecological assets – especially target stock levels – have more than one fishery objective (e.g. – ecological, economic, social). It is important to rate the risks associated with each relevant objective separately. The ecological risk may not always be the highest and it is important to clarify this before specific operational objectives and performance levels for management are set.



# Qualitative risk analysis (Consequence x Likelihood) – continued

- If a large group is participating in the risk assessment workshop, it can be more efficient to have the final risk score combinations chosen by a smaller “expert” panel (this panel can include non-technical people). The broader audience can provide their input during an open discussion phase and comment on the written outcomes. Detailed reporting of discussions can help with disputes over selected risk scores that may occur subsequent to the risk assessment workshop.

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# Qualitative risk analysis (Consequence x Likelihood) – continued



## Appendix

**Likelihood and consequence tables for qualitative risk assessment.** (All tables and supporting text and figures modified from Fletcher *et al.*, 2002, Fletcher, 2010; FAO, 2011).

**Table A1 Likelihood definitions** – these are usually defined for the likelihood of a particular consequence level actually occurring within whatever is the assessment period (5 years is common).

Level	Descriptor
<b>Likely (4)</b>	A particular consequence level is expected to occur. (Probability of 40–100%)
<b>Possible (3)</b>	Evidence to suggest this consequence level is possible and may occur in some circumstances. Probability of 10–35%.
<b>Unlikely (2)</b>	The consequence is not expected to occur but it has been known to occur elsewhere. (Probability of 2–10%).
<b>Remote (1)</b>	The consequence has never been heard of in these circumstances, but it is not impossible. (Probability < 2%).

To correctly assign these levels, it is important to recognize this is a conditional probability of a consequence occurring. It is the likelihood that, given a particular fishing management strategy (e.g., the current allowable catch levels for a tuna fishery), a particular level of impact (e.g., a reduction in spawning biomass to x percent of unfished levels) may ultimately be the result (either from an accumulation of small events over time, or from a single large event). It is NOT, as is commonly done when beginning this process, mistakenly assessing the likelihood that the particular fishing activity (i.e., catching the species) will occur. This type of error must be avoided.

**Table A2a Consequence categories for the major target/vulnerable species.**

The default objective is - maintain the biomass above the level that will generate MSY”.

Level	Ecological (target/vulnerable species)
<b>Minor (1)</b>	Either not detectable against background variability for this population; or if detectable, minimal impact on population size and none on dynamics. Exploited stock abundance range 100%–70% unfished levels.
<b>Moderate (2)</b>	Fishery operating at, or close to, the exploitation rate that will deliver MSY. Exploited stock abundance range < 70% to > $B_{msy}$
<b>Major (3)</b>	Stock has been reduced to levels below MSY and may also be getting into the range where recruitment overfishing may occur. Exploited stock abundance range < $B_{msy}$ to > $B_{msy} * 0.5$
<b>Extreme (4)</b>	Stock size or significant species range contraction > 50% have occurred and recruitment levels reduced affecting future recruitment and the capacity to increase from a depleted state (i.e. recruitment overfishing). Exploited stock abundance range < $B_{msy} * 0.5$

# Qualitative risk analysis (Consequence x Likelihood) – continued

**Table A2b Consequence categories for the major target/vulnerable species.** The default objective is - maintain spawning biomass at least above the level where it is likely not to result in recruitment overfishing.

Level	Ecological (target/vulnerable species)
<b>Minor (1)</b>	Either not detectable against background variability for this population; or if detectable, minimal impact on population size and none on dynamics. Spawning biomass 100%–70% unfished levels.
<b>Moderate (2)</b>	Fishery operating at, or close to, full exploitation rate but the long-term recruitment/dynamics are not being adversely impacted. Spawning biomass < 70% but > B <sub>rec</sub>
<b>Major (3)</b>	Stock has been reduced to levels that are now directly affecting future recruitment levels or severely affecting their capacity to increase from a depleted state (i.e. recruitment overfishing). Spawning biomass < B <sub>rec</sub> but > B <sub>rec</sub> * 0.5
<b>Extreme (4)</b>	Stock size and recruitment levels reduced to an extent that local extinctions or significant species range contraction > 50% have occurred. If it continues it would require listing in an appropriate endangered IUCN category and extinctions could result. Spawning biomass < B <sub>rec</sub> * 0.5

**Table A3 Consequence categories for the by-product species/minor bycatch species.** The default objective is - to maintain appropriate levels of biomass of bycatch species to minimize any significant impact on their dynamics and the broader ecosystem.

Level	Ecological (by-product/general bycatch)
<b>Minor (1)</b>	Take in this fishery is small (< 10%), compared to total take by all fisheries and these species are covered explicitly elsewhere. Take and area of capture by this fishery is small, compared to known area of distribution (< 20%).
<b>Moderate (2)</b>	Relative area of, or susceptibility to capture is suspected to be less than 50% and species do not have vulnerable life history traits.
<b>Major (3)</b>	No information is available on the relative area or susceptibility to capture or on the vulnerability of life history traits of this type of species AND the relative levels of capture/susceptibility suspected/known to be greater than 50%. The species should be examined explicitly.
<b>Extreme (4)</b>	N/A Once a consequence reaches this point it should be examined using Table A1.

# Qualitative risk analysis (Consequence x Likelihood) – continued



**Table A4 Consequence categories for the bycatch of protected species.** The default objective is – to maintain levels of catch of these species at acceptable levels.

Level	Ecological (protected species bycatch)
<b>Minor (1)</b>	Essentially no protected species are impacted.
<b>Moderate (2)</b>	The fishery catches or impacts these species at the maximum level that is accepted.
<b>Major (3)</b>	The catch or impact by the fishery on the protected species is above that accepted but there are few additional stock implications.
<b>Extreme (4)</b>	The catch or impact is well above the acceptable level and this is having significant additional impacts on the already threatened status.

**Table A5 Consequence levels for the impact of a fishery on the general ecosystem /trophic levels.**

The default objective is – to maintain any impact on the wider ecosystem by fishing to be within acceptable levels.

Level	Ecological (ECOSYSTEM)
<b>Minor (1)</b>	Some relatively minor shifts in relative abundance may be occurring but it is unlikely that there would be any measurable changes at the scale of trophic levels outside of natural variation.
<b>Moderate (2)</b>	Measurable changes to the ecosystem components without there being a major change in function. (i.e. no loss of components or real biodiversity); these changes are acceptable. None of the main captured species play a 'true' keystone role.
<b>Major (3)</b>	Ecosystem function altered measurably and some functions or components are locally missing/declining/increasing and/or allowed new species to appear. The level of change is not acceptable to enable one or more high level objective to be achieved. Recovery measured in many years to decadal.
<b>Extreme (4)</b>	An extreme change to ecosystem structure and function. Very different dynamics now occur with different species/groups now the major targets of capture and/or dominating the ecosystem. Could lead to a total collapse of ecosystem processes. Long-term recovery period may be greater than decades.



# Qualitative risk analysis

## (Consequence x Likelihood) – continued

**Table A6 Suggested consequence levels for the impacts on habitats.**

(Three levels – standard, fragile, critical). The default objective is – to maintain the spatial extent of habitat impacts from the fishing activity to a comparatively small percentage of the habitat/community.

Level	Ecological (HABITAT)
<b>Minor (1)</b>	Insignificant or barely measurable impacts on habitat(s) which are very localised compared to total habitat area. <i>(Suggestion – these impacts could be &lt; 5%; &lt; 3%; &lt;2%) of the original area of habitat).</i>
<b>Moderate (2)</b>	There are likely to be more widespread impacts on the habitat but the levels are still considered acceptable given the percent of area affected, the types of impact occurring and the recovery capacity of the habitat. <i>(Suggestion – for impact on non-fragile habitats this may be up to 50% [similar to population dynamics theory] - but for more fragile habitats, to stay in this category the percentage area affected may need to be smaller, e.g. 20% and for critical habitats less than 5%).</i>
<b>Major (3)</b>	The level of impact on habitats may be larger than is sensible to ensure that the habitat will be able to recover adequately, or it will cause strong downstream effects from loss of function. <i>(Suggestion - Where the activity makes a significant impact in the area affected and the area &gt; 25–50% [based on recovery rates] of habitat is being removed; whilst for critical habitats this would be &lt; 10%).</i>
<b>Extreme (4)</b>	Too much of the habitat is being affected, which may endanger its long-term survival and result in severe changes to ecosystem function and the entire habitat is in danger of being affected in a major way/removed. <i>(Suggestion this may equate to 70–90% of the habitat being affected or removed by the activity; for more fragile habitats this would be &gt; 30% and for critical habitats 10–20%).</i>

Assessing the habitat impacts that may result from each fishery should be done at a regional level, with impacts judged against the best estimate of the original extent of each of the habitats, not their current distribution. The assessment criteria have divided habitat into three categories, which recognize that not all habitats are equal – some are more fragile than others – often due to slower recovery rates. Also, some are more critical to the functioning of the ecosystem than others – providing substantially greater levels of fish recruitment or nursery habitat. This is why different levels of impact generate different levels of risk.

# Qualitative risk analysis (Consequence x Likelihood) – *continued*



**Table A7 – Suggested consequence levels for economic outcomes.**

The default objective is – Maintenance or enhancement of economic activity.

Level	Economic
<b>Minor (1)</b>	Possible detectable, but no real impact on the economic pathways for the industry or the community.
<b>Moderate (2)</b>	Some level of reduction for a major fishery or a large reduction in a small fishery that the community is not dependent upon.
<b>Major (3)</b>	Fishery/industry has declined significantly in economic generation and this will have clear knock on effects on other parts of the community. May result in some level of political intervention.
<b>Extreme (4)</b>	Total collapse of any economic activity coming from what was an industry from which the community derived a significant level of their income or employment (resource dependency), including possible debts. High levels of political intervention likely.

**Table A8 – Suggested consequence levels for social disruptions.**

The default objective is – Maintenance or enhancement of appropriate social structures and outcomes.

Level	Social implications
<b>Minor (1)</b>	None, or not measurable. Includes situations where there is no direct involvement by a community in the fishery.
<b>Moderate (2)</b>	Some direct impacts on social structures but not to the point where local communities are threatened or social dislocations will occur.
<b>Major (3)</b>	Severe impacts on social structures, at least at a local level.
<b>Extreme (4)</b>	Changes will cause a complete alteration to some social structures that are present within a region of a country.

**Table A9 – Suggested consequence levels for food security.**

The default objective is – Maintaining access to sufficient resources to enable the functioning of local or regional communities.

Level	Food security
<b>Minor (1)</b>	None, or not measurable. Includes situations where there is no direct impact on the resources used by a community.
<b>Moderate (2)</b>	Some direct impacts on food resources of a community but not to the point where these are threatened.
<b>Major (3)</b>	Significant and long term (> weeks) impacts on food resources of a community. Likely to lead to health problems.
<b>Extreme (4)</b>	Changes will cause a complete loss, or severe ongoing reductions, of some food resources within a region of a country leading to starvation and or abandonment of region, or requiring aid.



# Quantitative risk analysis

## EAF steps

Activity 2.2 - Issue prioritisation and risk assessment

Activity 3.3 - Management option evaluation and selection

## Purpose

Quantitatively determine stock status and the level of uncertainty of being above any threshold/limit level in the future depending upon the management arrangements adopted.

## Overview

Quantitative assessments use numerical values (rather than descriptive scales) for the evaluation of risk. They rely on a good level of scientific understanding and sufficient numerical information because the validity of the risk assessment is dependent on the availability of data, the accuracy and completeness of the numerical values and the methods/models used. Different types of consequence may be estimated by modelling outcomes of different management arrangements based upon extrapolation from observational studies and past data. Likelihood in this instance is usually expressed as a probability of being at, above or below some threshold/limit level.

## EAF tool tips

It is important to emphasise that the estimates and data used in quantitative assessment are often subject to variation and uncertainty so a sensitivity analysis or Bayesian approach is encouraged in order to test the effect of changes in values, parameters and assumptions on the results.

- All risk assessments depend to some degree on assumptions, extrapolations, estimates and approximations, and even the most sophisticated quantitative methods can have weaknesses that should be clearly documented and kept under review. Furthermore, even when quantitative assessments are highly robust they require a significant level of information and can only be applied to a small number of situations, usually in the assessment of a small number of data-rich target species.
- Note that anthropogenic climate change is likely to make some of the assumptions regularly used in quantitative assessment models over-simplified as the non-stationary nature of parameters like natural mortality (M) will make any dependent reference points (like FMSY) also non-stationary (i.e. will change through time).
- Quantitative assessments generally involve a considerable amount of subjectivity in the choice of model structure, in parameter values chosen and in the extent to which all such areas of uncertainty are explored and expressed in the results (Morgan, Henrion and Small. 1992, Hilborn and Walters 1992).
- Many modelling decisions are made by only a small group of individuals experienced in population modelling and not by a group of varied stakeholders. It has therefore been argued that in the absence of data, or in the face of incomplete or ambiguous knowledge, striving for precision can actually be counter-productive and produce meaningless risk metrics (Dambacher *et al.*, 2007) with a false sense of security achieved by the use of computer- based modelling.

# Quantitative risk analysis – continued

## Source of information

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# Dot based ranking and prioritisation methods (“spending your dollar”)

## EAF steps

### Activity 2.2 - Issue prioritisation and risk assessment

#### Purpose

To determine priorities or rank issues where a high level of direct involvement by stakeholders is appropriate and/or the levels of formal quantitative and qualitative information are both low.

#### Overview

Sticky dot voting (also known as “spending your dollar”) is used widely by workshop facilitators, to assist groups in the prioritisation of ideas and to decide which are the most important to take forward. This method is frequently used in conjunction with issue identification sessions such as brainstorming (see Fact Sheet). There are many variations on this theme but the core idea is that each stakeholder has a limited allocation of “money” (sticky dots) that they can use to spend on the issues they think are most important.

Whether an individual is allowed to use all their dots on the one issue or if they must spread them between different issues varies between facilitators, can have implications for the outcomes and will depend on the ratio of the number of dots to issues. Another variation is for the dots to have different values with the overall number of votes determined from the total of dot values, not just the number of dots.

#### EAF tool tips

**When is it good?** This technique can be particularly effective in the prioritisation process where participants are unwilling to rate any issue as anything but high risk or high priority. As there will not be enough dots to make everything the same priority, this approach forces participants to choose between options.

It can be the most robust prioritisation method when assessing social or perception based issues. In these situations you are trying to get the group to rank different options and their opinions and perceptions of what is most important are what needs to be measured.

If there really are a number of high priority issues then this method can be used to determine which is considered the most important to address – or at least the order in which to begin.

**When is it not so good?** It is not too good for prioritising issues that require a high technical understanding to determine what is the most important – i.e. assessments that should not be perception based. Also, the most popular option may not always be best if the more appropriate options involve some level of impact on stakeholders. They may vote not to do something or choose the least “bad” option even though this has the worst longer term implications. This just means that the options provided for voting must all generate acceptable outcomes.

# Dot based ranking and prioritisation methods (“spending your dollar”) – *continued*

**How many dots?** If people get too many dots, the exercise can take too long to complete, the scores become too similar and the discriminatory power between issues is compromised. The practical upper limit is about 10 dots per person but this would have to be for > 50 issues. On the other hand, if voters aren't given enough dots, it's too difficult for them to decide between issues. The practical minimum is about three dots per person. About four to five dots per person is normally a good number to use but the ideal number will be a function of the number of choices (e.g. dots = number of issues divided by five).

**Big groups** – instead of having dots per person you can give dots to a group. This can, however, result in the “loudest” individual dominating the allocation of dots. A skilful group leader should be able to minimize this bias.

**How to vote – as a group or individually?** If you have everyone vote as a group by putting their votes on the cards on a big board there can be a level of group think – once a few dots are placed on an issue, others can be more likely to put theirs on the same one. Alternatively, some may not want to vote for the same issues as someone else. To stop these biases, use a voting sheet for each person so they can do it anonymously and without the influence of others.

**Use more than one set of categories for voting** It may be best to undertake more than one sticky dot exercise where multiple EAF categories are being assessed or the number of issues get above about 40. For example, you should complete one exercise ranking all the ecological issues and then complete a separate exercise to rank all the social/economic issues. This stops some individuals from specific interest groups only putting ratings into their particular areas of interest and enables the more ideological debates associated with ecological and socio-economic issues to be considered in alternative forums.

**Game theory** There can be an element of game theory that comes into play when participants start to consider how other stakeholders will vote and this could influence how they will spend their votes to achieve the outcome they want. The level to which this may be a problem will influence whether it is appropriate that individuals are allowed to use all their dots on one issue or not.

## Source of information

### Sticky dots

[www.audience dialogue.net/dotmocracy.html](http://www.audience dialogue.net/dotmocracy.html)

<http://businessanalystmentor.com/2009/04/05/prioritising-requirements-why-you-should-do-it-and-how/>



# Multi-Criteria Decision Analysis (MCDA)

also known as Multi-Objective Decision Analysis (MODA)

## EAF steps

Activity 2.2 - Issue prioritisation and risk assessment

Activity 3.3 - Management option evaluation and selection

## Purpose

MCDA involves the simultaneous use of multiple indicators and information (both qualitative and quantitative) to assist in the decision making process to:

- Generate priority ranking of issues for use of management resources by:
  1. identifying the highest priority issue;
  2. compiling a short list of issues for additional appraisal; or
  3. distinguishing between acceptable and unacceptable issues.
- Compare relative performance of different management options across a number of competing fishery objectives or differing stakeholder preferences.

## Overview

Management of marine fisheries is significantly complicated by the fact that usually there is more than one set of objectives and therefore criteria of relevance in evaluating fishery performance. The problem is not just one of maximizing the economic rent generated by the fishery, but also of sustaining biomass of target and incidental (usually threatened) species above certain levels, and perhaps of maximizing food production, coastal employment, and export earnings. In this type of problem, decision-makers must make trade-offs between conflicting criteria. Different kinds of objectives can be included, expressing not only economic values of products but also addressing goals which cannot always be expressed in monetary terms such as biodiversity, people's preferences, equity, or minimizing risk and uncertainty. The factors of a solution are not fixed values, but are variable or fuzzy within certain ranges determined by resource availability and socio-economic realities.

There are a large number of specific methods and names (MCA, MCDA, etc.) that fall within the category of multi-criteria type of analysis. While there are subtle differences in the emphasis of each, essentially they all operate by some "formula" that uses more than one criterion or attribute to generate outputs designed to help make better decisions. The information can be either qualitative or quantitative and it has the advantage over cost-benefit analysis because it does not rely on the use of monetary valuations.

# Multi-Criteria Decision Analysis (MCDA)

also known as Multi-Objective Decision Analysis (MODA) – *continued*

The decisions assisted by MCDA methods fall into two main categories:

- the determination of priorities of issues for action (Activity 2.2);

(In this instance multiple criteria are used to develop a list of relative importance for issues based on a number of inputs).

- the determination of the “best” management options to deal with an issue or multiple issues (Activity 3.3).

The goal of the optimization process using MCDA is to assist in ensuring that the best possible trade-offs are made for a given fishery management problem. As in “real world” situations, solutions to problems are reached as compromise solutions, resulting from trade-offs between various conflicting objectives of the stakeholders through negotiations to reach a consensus. In such situations the approach is not to maximize all the objectives, but to optimize, that is, to find an acceptable balance between the requirements of the stakeholders. This involves seeking “optimal solutions” to multiple criterion optimization problems whereby changing one decision-making criterion cannot be improved without making the overall fishery performance worse off with respect to at least one other resource management criterion.

## How is it done?

MCDA may be done informally or by using more formal methods. In the latter category there is a range of methods available along with computer software for applying some of them. Typically, MCDA involves the following steps:

- Identify the objectives or criteria that will be used to influence the final choice. These should be clearly specified, ideally measurable (at least semi-quantitatively), and, so far as possible, mutually independent.
- Forecast, for each policy option, the expected levels for each decision criterion.
- Assign a preference measure to each of these criteria levels for each policy option. The preference function may be a proportionate score (that is, a linear preference function), or a utility value (that is, a nonlinear preference function).
- Assign weights to be applied to the preference measures for the different criteria. The weighting function may be linear and additive or of some other form. The interrelated nature of the different objectives may make a linear and additive model misleading, yet the added complexity of non-linear models may limit their appeal.
- Calculate the measure of overall value or merit to determine the best option using a simplistic weighted average of the scores, with the option providing the highest weighted score being the one that is “best”. More sophisticated techniques might be used for more complex situations.



# Multi-Criteria Decision Analysis (MCDA)

also known as Multi-Objective Decision Analysis (MODA) – *continued*

## EAF tool tips

### Advantages

The main advantage of multi-criteria scoring models is that they provide a way to capture the multiple considerations that are relevant when deciding which of the issues has the highest priorities or which of a series of management options is the best.

Scoring systems for multiple criteria are very easy to create and simple to understand. A scoring model can easily be implemented in Excel or one of the other standard computer spreadsheet tools. These models are flexible and can be easily altered or changed to accommodate changes in preferences or government policy. Another advantage is that although these models are developed for issue selection, the same models can be used as a guide for issue improvement. An issue's score on each criterion can be compared with the best possible score. The differences, when multiplied by the weights, indicate the types of improvements that would most improve the attractiveness as measured by the scoring model.

### Disadvantages

It is important to recognize that the criteria can often overlap or represent similar or related objectives, and this overlap can produce significant biases.

While MCDA is a flexible method that appears to be adapted to analysis for policy planning, the complexity and the demands it places on decision makers to be explicit about their objectives and values may limit its use.

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Web Hipre: Global decision support. (Available at [www.hipre.hut.fi/](http://www.hipre.hut.fi/)).



# Examples of operational objectives for use in EAF

## EAF steps

### Activity 3.1 - Determine operational objectives

#### Purpose

To help in the identification, development and selection of appropriate operational objectives for each of the issues that will be directly managed through the EAF Management Plan.

#### Overview

The operational objectives chosen for each of the issues to be managed need to be outcome-based and are best described by answering the question: "What do you want the fishery to achieve for this component at the moment and why?"

After undertaking this exercise across a number of different fisheries, a set of example operational objectives has been collated that may be useful as a starting point for developing the operational objectives of any fishery.

The Appendix outlines some of the most common operational objectives that have been developed for use in each of the main areas of EAF (ecological; social; economic and governance) including some description of why these were chosen.

The examples can be used to select an appropriate objective for your fishery, or they can be useful just as a starting point for the development of a specific operational objective. It is likely that at least one or more will be directly applicable somewhere in your fishery.

#### Source of information

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# Examples of operational objectives for use in EAF – *continued*

## Appendix

### Examples of operational objectives for use in EAF (from Fletcher, 2010.)

#### TARGET SPECIES

Four alternative **formal** operational objectives for target species that have been developed are to:

- “Maintain spawning biomass at least above the level where it is likely not to result in recruitment overfishing”. This is based on wanting to avoid recruitment overfishing and so would be appropriate to meet a stock sustainability (ecological) objective.
- “Maintain the biomass above the level that will generate maximum sustainable yield (MSY)”. This is based on wanting to maximize the catch levels and would therefore be relevant to meeting a social or food security related objective.
- “Maintain the biomass above the level that will generate maximum economic yield (MEY)”. This is based on wanting to maximize the level of economic return or profit that the fishery will generate and is therefore relevant to meeting an economic objective for the stock.
- “Maintain the biomass of keystone species at levels that will ensure maintenance of their specific role in ecosystem function”. This is only relevant where a true keystone species (e.g. not just any apex predator) is involved and is therefore relevant in meeting an ecosystem objective.

The justification for the first objective relates to a normal fisheries management requirement to keep recruitment levels unaffected by a reduction in spawning stock. This does not mean that recruitment will necessarily be constant or high, just that it should only vary due to environmental factors – not from the impact of the fishery.

Meeting the first of the objectives should ensure sufficient spawning stock to continue recruitment at levels that will replenish the stock taken by fishing, predation and other environmental factors. Depending upon the species and other issues, it may be necessary to have an objective that is more conservative than this (for example – the level of decline in biomass where growth overfishing begins is usually reached before the level where recruitment overfishing begins). Thus, there may be other economic or socially-based reasons for why this objective is not used, with either a more aggressive or more conservative approach taken. In either case, these would need to be justified. This may be the case where a species is not the main target species but has a higher vulnerability – it may be agreed that this species can be “overfished” to some degree. This degree would still need to be determined and justified. Finally, in a very rare number of cases where the species forms a particular functional role in the community (with no redundancy) this may require it to be at higher levels of abundance than merely to maintain catch or recruitment levels.

Meeting each of these operational objectives would have different implications for the acceptable level of stock depletion. In most circumstances meeting the recruitment overfishing objective would allow the highest level of stock depletion, with the stock level needing to be progressively higher to meet the MSY, MEY/ecosystem objectives respectively.

The operational objectives above may be considered too technical for some circumstances, so less formal versions can also be used.

# Examples of operational objectives for use in EAF – *continued*



## Less formal

- Maintain stock abundance (or catch or effort) at or near current levels (where you think the stock is at about the right level; currently OK).
- Increase stock levels by x percent (where you think it is not OK).
- Reduce catch/effort by x percent (where these are considered too high).

These less formal operational objectives will often include the indicator and performance measure in the one statement – that is fine.

“Ensure catch levels meet the country’s convention obligations”.

“Ensure catch levels do not exceed that determined as being appropriate for the exclusive economic zone (EEZ) based on a catch rate weighted area calculation”.

## NON-TARGET (by-product) SPECIES

The common operational objectives for by-product species can use the same format as target species.

### Formal

- Keep stock levels above  $B_{MSY}$ .
- Keep stock levels above the level of recruitment overfishing.

### Less formal

- Maintain catch levels in historical range.
- Do not increase catch levels by more than x percent.
- Reduce catch levels by x percent.

## BYCATCH (discarded) SPECIES

The types of objectives for bycatch species which are only ever discarded differ from the target and by-product species in that none are desired to be caught. The question is whether the levels of depletion caused by their capture are really an issue for the bycatch species, or whether the main concerns from this are generated from the discards they produce (i.e. provisioning) or whether the concerns are largely socially driven community acceptance/wastage problems. Furthermore, for some “protected” species, such as turtles, dolphins etc., it may be considered inappropriate to capture them irrespective of local population sizes. For example, many countries require that dolphins and turtles are not captured by fishing activities, or their capture is minimized, before they will allow imports of the targeted species (e.g. shrimp, tuna). There are, therefore, a number of very different circumstances involved with this group of species and hence different operational objectives will be relevant.

For some fisheries, the most practical objective is to reduce the levels of capture of non-retained species from historical levels. For other fisheries, especially when dealing with threatened species, the total elimination of all capture may be the goal. Finally, for fisheries where the current levels are acceptable, the objective may merely be to avoid any future increases. Where the issue with discards is wastage not stock sustainability, then better utilisation of the catch can be used as a method of developing an operational objective.



# Examples of operational objectives for use in EAF – *continued*

Consequently, the most common objectives developed for non-retained species so far are:

## **General discard species**

- To maintain appropriate levels of biomass of bycatch species to minimize any significant impact on their dynamics and the broader ecosystem.
- To minimize/decrease/eliminate the impact of the fishery on the species.
- To maintain appropriately low levels of impact of the fishery on the species.

## **Protected / iconic species**

- “To keep the level of capture of this species at acceptable levels”.

## **Wastage**

- “To minimize the wastage of captured species”.

## **Informal**

- Do not increase the level or area of capture of discarded/protected species (where the current level of capture and discarding is considered acceptable).
- Reduce the level or area of capture of discarded/protected species (where the current level of capture and release is considered too high).
- Reduce the level of discarding for bycatch species (where wastage is considered too high).
- Increase the survivorship of discarded species (where capture can't be avoided but the mortality of the discards can be improved).

## **ECOSYSTEM**

### **Ecosystem structure**

This is probably the least well understood element of this reporting system. Consequently, the types of objectives developed for the issues in this category are probably the least well developed of all.

Common operational objectives for ecosystem structure are:

- To maintain any impact on the wider ecosystem within acceptable levels;
- To maintain appropriate levels of biomass of target and other by-product species to minimize any significant impact on the broader ecosystem;
- To maintain the spatial extent of the fishing activity to a comparatively small percentage of the habitat/community.

# Examples of operational objectives for use in EAF – *continued*



Having the phrase “within acceptable levels” is important because it allows some change – given that there can always be some change generated by fishing. It also recognizes that what is acceptable will depend upon the other uses of the ecosystem. These objectives will have obvious overlaps and interdependencies with the operational objectives chosen for the captured species and habitats.

## **Less formal operational objectives can include:**

- Ensure that there are no major shifts in the relative species composition/relative trophic levels of the community;
- Keep the total levels and composition of removals by the fishery at current levels.

## **Habitat**

Default objective *“To maintain the spatial extent of habitat impacts from the fishing activity to a comparatively small percentage of the habitat/community”.*

Assessing the habitat impacts that may result from each fishery should be done at a regional level, with impacts judged against the best estimate of the original extent of each of the habitats, not their current distribution.

Less formal objectives can include:

- No increase in the areas of habitat directly impacted by the fishery;
- Keep the area of impact within historic boundaries.

## **SOCIAL and ECONOMIC issues**

### **Objectives – “Preferred outcomes”**

The decision to directly get involved in setting specific objectives for social and economic elements will vary between countries. This is usually an indication that most community level objectives are set by the government and fisheries agencies may only play a part. So, in many cases it may be that the operational objectives are better described as preferred outcomes.

There are a number of common operational objectives that can be used for the social and economic issues:

- Social – *Maintenance or enhancement of appropriate social structures and outcomes.*
- Minimize the negative community impacts of fishery management decisions on the fishery and maximize the positive impacts.
- To have safe and healthy work practices that minimize deaths and work related injuries for those involved in the fishing and related activities.
- Economic – *Maintenance or enhancement of economic activity.*
- Maximize/optimize net economic return from the fishery.
- Food security – *Maintaining access to sufficient resources to enable the functioning of local or regional communities.*

# Examples of operational objectives for use in EAF – *continued*

The following table includes some suggestions for operational objectives for various specific social and economic components based on case studies (from Fletcher, 2010.)

Component	Possible operational objective
<b>Effects of fishery on industry participants</b>	
<b>Economic</b>	
<b>Income</b>	Maintain or increase income to fishers
Employment	Maximize local employment in fishery
Food security	Ensure level of catch meets food requirements of sector
<b>Social</b>	
Health	Minimize death and accident rate for fishers
Lifestyle benefits and costs	Maintain or improve lifestyle for fishers Ensure crew separation from family does not cause unnecessary problems
Allocation	Acceptable levels of allocation of access between fishers and sectors
<b>Effects of fishery on communities</b>	
<b>Economic</b>	Maintain or increase jobs, profits and flow-on benefits to the community
<b>Social</b>	
Social capital	Maintain or increase the contribution the fishery makes to social capital at the local scale
Employment	Maintain or increase regional/local employment in the fishery and related industries
Regional industry	Maintain or improve local/regional attitudes to the fishery
<b>Effects of fishery on national economic wellbeing</b>	
<b>Economic</b>	Maintain or increase the contribution of the fishery to the national economy
Import replacement	Maintain or increase the proportion of domestically - harvested fish consumed
<b>Social</b>	
Health benefits/risks seafood eaten	Improve human health/nutrition at the national level by increasing fish consumption
Seafood quality	Ensure seafood meets food safety requirements

# Examples of operational objectives for use in EAF – *continued*



## Governance issues

**Overall objective** - In consultation with the relevant industry groups and other relevant stakeholders, periodically review the management plan, related legislation, regulations and arrangements to ensure they remain relevant and aligned with the fishery's management objectives and that collectively they cover as many of the agreed principles of good governance as possible. Specifically, for the main components in the governance area of EAF, the following have been applied.

Component	Possible operational objective
Legislation	Ensure legislation allows the development of effective regulations and management arrangements
Management plan	Having an effective management plan that will deliver the objectives of the fishery
Management effectiveness	Ensure that the management system is effective
Compliance	Ensure that there is an acceptable level of compliance
Monitoring	Ensure that there is an effective monitoring programme for each of the management systems
Reporting	There is appropriate reporting to all relevant stakeholders
Consultation	There is effective consultation with key stakeholders



Photo: D. Minkoh/FAO





# Reviews and summaries of indicators and performance measures for use in EAF

## EAF steps

### Activity 3.2 - Indicator and performance measure selection

#### Purpose

Use of reviews and summaries of completed EAF based assessment to help in the identification of relevant and cost effective indicators and their associated performance levels that will be used to monitor the success of the management plan in meeting each of the operational objectives.

#### Overview

Through experience in undertaking this exercise across a number of different fisheries, a set of example indicators and performance measures have been collated that may be useful as starting points for developing the operational objectives of any fishery.

The Appendix summarises some of the most common indicators, performance measures and management responses that have been developed for use in each of the main areas of EAF (ecological; social; economic and governance) including some description of why these were chosen.

The FAO Technical Guidelines (2003) include a summary table of indicators for the social, economic and governance aspects of EAF.

The ESD Assessment Manual (Fletcher *et al.*, 2003) has more detailed analyses of what indicators, performance measures and management responses have been, or should be, used for different types of target and bycatch species. This section has been divided into invertebrates and finfish groups and covers some of the main types of species within both of these. This manual also discusses ecological, social, economic and governance indicators. The examples can be used to select an appropriate objective, indicator and performance measure combination for your fishery, or they can be useful just as starting points for the development of specific sets for use in your fishery.

There are also a number of formal publications listed that may provide more detailed information on this topic, especially for the ecological indicators.

#### EAF tool tips

There is now a large amount of knowledge on how the various combinations of indicators, performance measures and management responses will work across a wide range of species and fishery situations. One of the main things to remember is to try and determine what is unlikely to work in your situation and ensure you avoid using this combination.

There is no management method or indicator that will be appropriate in all circumstances.

# Reviews and summaries of indicators and performance measures for use in EAF – *continued*

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# Reviews and summaries of indicators and performance measures for use in EAF – continued

## Appendix

**Examples of indicators and performance measures for use in EAF.** Extracts from FAO, 1999 and Fletcher, *et al.*, 2003.

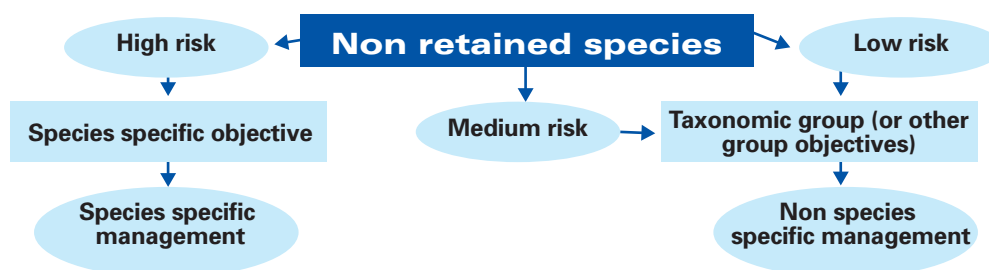
**Table 1 – Robustness of different types of indicators and performance measures to manage the abundance of target species.**

### Summary of finfish / Invertebrates

	Finfish e.g. tuna and billfish	Invertebrates e.g. rock lobster
<b>Characteristic</b>		
Vulnerability to fishing	LOW–HIGH	MOD–LOW
<b>Performance measures</b>		
<b>Biological reference points</b>		
Spawning biomass limit	20%	10%–22% Bo
Lowest level reached	5%	<10% – 15%
Max. expl. rate	10%	60%
<b>Economic reference points</b>		
MSY/MEY	40%	
<b>Indicators (robustness)</b>		
Catch	LOW	LOW–MOD
Catch rate	LOW	MOD
Independent survey	LOW–MOD	MOD–HIGH
Age/size models	MOD	MOD–HIGH
Probability of future	HIGH	MOD–V HIGH
Recruit. surveys	LOW	LOW–HIGH-

### Bycatch (discarded) species

Species of particular concern, for whatever reason, should be dealt with on an individual species or stock basis. The remaining species should be grouped or dealt with as individual stocks using a risk assessment approach as illustrated below.



# Reviews and summaries of indicators and performance measures for use in EAF – continued



## ECOSYSTEM

### Ecosystem structure

#### Indicators

The type of indicator appropriate for these ecosystem issues includes:

#### Process/pressure indicators

- area trawled;
- effort levels;
- biomass reduction; and
- relative levels of biomass removed.

#### Direct indicators

- monitoring area of habitat; and
- monitoring the community.

The latter group of indicators may only be required if the impact of the activity is likely to be major and/or the fishery operates over a relatively wide area of the habitat. Precisely what can be measured beyond process/pressure-based indicators is not clear in most cases, except for the possibility to choose one or more “indicator” species to measure overall performance.

The selection of these species would need to be justified. It is possible that some multi- species analysis could be used, but this has not yet been seen in the completed studies to date.

### Performance measures

#### Trophic interactions/biodiversity

While much has been written in general about the need to maintain the ecosystem and have ecosystem-based management, there are few quantitative studies available upon which to base sensible performance measures for management. This is most notable in trophic level interactions, where studies show that interactions of this kind are usually non-linear and vary greatly between systems and species within a system. Thus, there is no precise “state” that an ecosystem should be at, as natural systems vary (particularly the individual components) even without any human “assistance”.

The decision tree that could be used to assist in determining whether there is a high likelihood of interactions includes:

- is there a single apex or keystone predator?
- is there a keystone grazer in the system?
- is there evidence or even a reasonable suspicion that strong interactions may be occurring in this system?
- are there only one or two species within the affected trophic levels?

If all the answers to the above questions are “no”, then it may be possible to argue that the mere maintenance of reasonable levels of the harvested species should be sufficient to maintain general ecosystem function.

If the answer to one or more of these is “yes”, then there may be a need to directly monitor other elements of the ecosystem. Further, the level of reduction in target stocks may need to be set with this in mind – particularly with respect to minimising the risk of stock collapse.



# Reviews and summaries of indicators and performance measures for use in EAF – continued

## SOCIAL and ECONOMIC issues

### Objectives – “preferred outcomes”

The decision to directly get involved in setting specific objectives for social and economic elements will vary between countries. This is usually a reflection of the fact that most community level objectives are set by the government and fisheries agencies may only play one part in the achievement of adequate performance. So, in many cases it may be that the operational objectives are better described as preferred outcomes. Table 2 lists possible objectives and related indicators for different socio-economic issues.

**Table 2 Possible socio-economic objectives, indicators and data requirements** (modified from Fletcher *et al.*, 2003; Fletcher, 2010).

Component	Objective	Indicator (performance measures)	Data requirements
<b>Effects of fishery on industry participants</b>			
<b>Economic</b>	Maintain or increase income to fishers.	Change in level of poverty of fishers. Value of production. Economic return – value minus costs. Number of fishers going broke. Number of new vessels being purchased. Licence value (if limited entry).	Catch. Beach value. Costs of fishing. Bankruptcies – forced sale of licences. Boat sales. Licence values.
<b>Employment</b>	Maximize local employment in fishery.	Percent of locals in the fishery.	Employment figures for fishers and total.
<b>Food</b>	Ensure level of catch meets food requirements of sector.	Estimate of subsistence catch. Catch per participant. Catch per community member. Changes in the nutritional status of community.	Estimate of catch. Number of participants. Number of people in community. Health levels of community.
<b>Social Health</b>	Minimize death and accident rate for fishers.	No greater than national average for work-related injuries.	Injury data from relevant government authority or community.
<b>Lifestyle benefits and costs</b>	Maintain or improve lifestyle for fishers.	Change in the number of fisher complaints. Change in the level of social problems associated with fishers.	Submitted complaints. Community welfare records. Police statistics.
	Crew separation.	Number of complaints by wives of husbands being away too long. Wives coming to agency.	
<b>Allocation</b>	Acceptable levels of allocation of access between fishers and between sectors.	Number of fights between different sectors, or between individuals of the one fishery. Number of agreed allocation outcomes.	Recorded conflicts. Complaints received. Police actions. Records of meetings.

# Reviews and summaries of indicators and performance measures for use in EAF – continued



Component	Objective	Indicator(performance measures)	Data requirements
<b>Effects of fishery on communities</b>			
<b>Economic</b>	Maintain or increase jobs, profits and flow-on benefits to the community.	Direct and flow-on contributions to the region. Gross value of product (beach price * quantity). Number of people employed in associated industries. Multiply GVP by flow on multiplier (often use x 4).	Regional input-output analysis done periodically (e.g. 10 years). GVP. Census data. Estimate of flow on impacts.
<b>Social capital</b>	Maintain or increase the contribution the fishery makes to social capital at the local scale.	Relative level of social problems in fishing based communities.	Interaction of fishers, their families and people in closely-related industries (e.g. boat building) in local social fabric.
<b>Employment</b>	Maintain or increase regional/local employment in the fishery and related industries.	Employment in the harvesting and processing sectors, and flow-on employment in other industries.	Employment numbers.
<b>Regional industry</b>	Maintain or improve local/regional attitudes to the fishery.	Positive and negative feelings to the fishery. Number of complaints to agency/ Minister/media.	Attitudinal surveys done occasionally. Ad hoc media comments.
<b>Effects of fishery on national economic wellbeing</b>			
<b>National economy</b>	Maintain or increase the contribution of the fishery to the national economy.	Net economic return for the fishery. (Achieving MEY).	Economic survey data gathered periodically (e.g. 5 years).
<b>Import replacement</b>	Maintain or increase the proportion of domestically-harvested fish consumed.	Consumption per capita of local seafood. To achieve at least an average consumption level of locally-harvested seafood.	Consumption surveys. Population census.
<b>Health benefits/ risks seafood eaten</b>	Improve human health/nutrition by increasing fish consumption.	Consumption per capita of local seafood.	Consumption surveys.
<b>Seafood quality</b>	Ensure seafood meets food safety requirements.	Food safety reports.	Food safety reports.

# Reviews and summaries of indicators and performance measures for use in EAF – continued

## Governance issues

**Table 3 Governance indicators** (modified from Fletcher *et al.*, 2003; Fletcher, 2010).

GOVERNANCE			
Component	Objective	Indicator (performance measures)	Data requirements
<b>Legislation</b>	Ensure legislation allows the development of effective regulations and management arrangements.	Number of proposed management arrangements that cannot be undertaken because the legislation will not allow it.	Examination of legislation.
<b>Management plan</b>	Having an effective management plan that will deliver the objectives of the fishery.	Number of essential management plan elements that are included.	Examination of plan.
<b>Management effectiveness</b>	Ensure that the management is effective.	Licence fees. Complaints from Minister, fishers, public etc. Number of objectives where performance is considered acceptable.	Data from licence transactions. Examination of indicators and PMs.
<b>Compliance</b>	Acceptable level of compliance.	Estimate of illegal catch. Estimate of compliance with rules.	Surveys. Estimates. Operations.
<b>Monitoring</b>	Effective monitoring programme.	Percentage of indicators that are being measured to an acceptable level.	No of indicators being measured.
<b>Reporting</b>	Appropriate reporting.	Stakeholder satisfied.	Stakeholder survey.
<b>Consultation</b>	Effective consultation with stakeholders.	Number of stakeholder meetings held. Number of stakeholders contacted. Level of complaints from stakeholders.	Stakeholder survey. Records of mail outs. Complaints. Minister.



# Community based or participatory monitoring and evaluation

## EAF steps

Activity 3.2 - Indicator and performance measure selection

Activity 4.3 - Review performance of the management system

## Purpose

To develop and monitor suitable indicators based on locally collected data to provide a practical and cost effective method to measure progress towards meeting the operational objectives of EAF.

## Overview

Community-based ecological monitoring (CBM) or participatory monitoring and evaluation (PM&E) and research is the process of integrating public/community participation in the collection, analysis and interpretation of data, changes or trends in the natural environment that occur in a particular ecosystem. The relationship between conservation and community is central to these concepts because for conservation efforts to be successful and sustainable there has to be involvement and ownership at the local or community level.

CBM/PME can focus on the biotic and abiotic parameters of the environment, identify and determine causal relationships and attempts to determine anthropogenic and natural impacts, as well as the outcomes of management interventions. This information is important in guiding adaptive management. CBM enables stakeholders (community) to recognize the negative ecological effects of their activities at an early stage and to adapt their actions.

These processes require early and continuous consultation with members of the community who have a stake in their natural resources and are interested in monitoring and conservation efforts. The basic elements of CBM include having clearly defined goals and objectives for monitoring; participatory design of a monitoring plan (including selection of appropriate monitoring sites, monitoring protocols, indicators for monitoring and determination of the frequency of monitoring); baseline data collection; data analysis; feedback and critical evaluation of the monitoring methodology.

## EAF tool tips

The negotiation that leads to agreement on how progress should be measured and the findings acted upon is a challenging process because different stakeholders are required to examine their assumptions about what constitutes progress. Engaging and encouraging community participation in monitoring ensures such ownership at the local level. This can be a valuable source of information that aids conservation and informs management decisions. It can also be a useful tool for environmental outreach as well as a means to connect scientists with experienced field personnel.

In the case of coastal managers, information and data gathered via CBM initiatives sometimes fail to be integrated into mainstream decision-making processes since they are often developed separately from the management and policy making processes rather than emerging from within. EAF can promote the inclusion of this information since it is not limited to management but applies *inter alia* to policy, legal frameworks and planning.



# Community based or participatory monitoring and evaluation – continued

It should be noted that CBM does not necessarily, and in fact rarely, involves only the community. Appropriate expertise is critical during the implementation phase and periodically during the operational or monitoring phase to ensure that monitoring suits both the community's and management's needs for information.

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# Harvest strategies and control rules

## EAF steps

Activity 3.2 - Indicator and performance measure selection

Activity 4.3 - Review performance of the management system

## Purpose

Harvest strategies and decision rules provide a formal and more consistent approach to the management decision making process by defining what actions will occur based on the current or likely future performance of a fishery in relation to one or more of its operational objectives.

## Overview

A harvest strategy often consists of a number of core components:

1. The articulation, at an operational level, of what is to be achieved and why, both for the resource and the relevant fisheries (operational objectives);
  - How performance against these objectives will be measured (indicators) and interpreted (performance levels). These performance levels include:
    - A specified target around which a fishery or stock should fluctuate.
    - A soft limit (often called a threshold) that triggers a requirement for a formal, time-constrained rebuilding plan.
    - A hard limit below which fisheries should be considered for closure.
2. The predefined set of harvest or control rules used to determine the appropriate catch levels or other management actions that need to be applied, based on current (or expected future) status to avoid thresholds or limits and to help reach targets.
3. The specific management decisions and actions (catch/effort decision rules) that define whether the catch levels that are currently being taken, or the effort levels used by each of the relevant fisheries, are consistent with meeting the appropriate catch levels as defined by the harvest control guidelines.

To be effective, a harvest strategy for a fishery requires each of these core elements to be present and functional.

# Harvest strategies and control rules – continued

## EAF tool tips

Harvest strategies are developed to help meet the high level ecological, social and economic objectives for the relevant resources and their associated fisheries. While many of these high level objectives have a strong theoretical or conceptual basis (e.g. avoiding recruitment overfishing, achieving MEY, etc.), with the level of information and monitoring systems generally available in most fisheries, few of these will be directly measured. Most situations will require the translation of these conceptual objectives into operational objectives that have a direct and practical interpretation for the management of the fishery. This means that they can be measurable and auditable given the current or proposed system of data collection. The translation of conceptual objectives into operational objectives and their associated indicators and performance measures is the most important element involved in developing a harvest strategy for resources and fisheries.

The more precise and accurate the indicator and performance levels, the more precise the predefined actions can be.

## Source of information

Commonwealth Government. 2007. Commonwealth fisheries harvest strategy policy. Commonwealth Government Department of Agriculture, Fisheries and Forestry, Canberra, Australia. 55 pp. (Available at [www.daff.gov.au/\\_\\_data/assets/pdf\\_file/0004/397264/HSP-and-Guidelines.pdf](http://www.daff.gov.au/__data/assets/pdf_file/0004/397264/HSP-and-Guidelines.pdf)).

Government of Canada, Fisheries and Oceans. A fishery decision-making framework incorporating the precautionary approach. (Available at [www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm](http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm)).

New Zealand Government. 2008a. Harvest strategy standard for New Zealand fisheries. Ministry of Fisheries, New Zealand. 25 pp. (Available at <http://fs.fish.govt.nz/Doc/16543/harveststrategyfinal.pdf.ashx>).

New Zealand Government. 2008b. Operational guidelines for New Zealand's harvest strategy standard. Ministry of Fisheries, New Zealand. Draft. 34 pp. (Available at <http://fs.fish.govt.nz/Doc/16546/OperationalGuidelinesfortheHSSOct08.pdf.ashx>).

## Other relevant references

Dowling, N.A. *et al.*, 2008. Developing harvest strategies for low value and data-poor fisheries: case studies from three Australian fisheries. *Fisheries Research*, 94:380–390.

Gabriel, W.L. & Mace, P.M. 1999. *A review of biological reference points in the context of the precautionary approach*. Proceedings, 5th NMFS NSAW. NOAA Tech. Memo. NMFS-F/SPO-40.

Rosenberg, A. & Restrepo, V. 1996. Precautionary management reference points and management strategies. In: FAO. 1996. *Precautionary approach to fisheries*. Part II. Rome, FAO. Scientific papers. FAO Technical Paper No. 350, Part 2. 210 pp.



# Fishery management measures - manuals and reviews

## EAF steps

### Activity 3.3 - Management option evaluation and selection

#### Purpose

To help in the selection of the most relevant and cost effective management responses within the management plan to successfully meet each of the operational objectives, covering both the ecological components and the human wellbeing components of EAF.

#### Overview

A large number of manuals and reviews of fisheries management have been developed over the past few decades; these summarize what types of management measures are available and in what circumstances they should be applied. Some books and manuals cover almost all types of fishery related issues at a high level. There are also more detailed and dedicated manuals, reports and web pages that deal with specific aspects of fishery management. These components include:

- Target stocks
- Bycatch and discards
- Fishing capacity
- Spatial management (including the use of MPAs)
- Economic and social outcomes and issues (assessment methods, safety at sea, child labour, food safety, post harvest, etc.)

As there are a considerable number of such manuals we have restricted the number listed here to those that will provide a good entry into each of the categories, focusing on FAO based publications because these will generally be free and available online. Many other books and reports are available and a few key ones have been added in the other relevant resources section. These may, however, need to be purchased.

#### EAF tool tips

Given the broad nature of EAF, many of the management approaches (e.g. safety at sea, post harvest, etc.) are designed to contribute to human wellbeing, not just to ecological wellbeing.

The management measures that will have the most chance of success are those that are developed with the specifics of the fishery in mind, and a recognition of what capacity is available to administer and enforce them. What can work very well with a high level of resources will often fail where these are not available.

For the target species, as outlined in the Activity 3.3, most of the management measures for stock management will involve some combination of restricting access, vessels, gear, catch, areas, time, etc. The main trick is to keep focused on what is going to best achieve your outcomes and not focus on what is currently the most popular management tool. A management method that is applied elsewhere may not be the most appropriate for your case.



# Fishery management measures - manuals and reviews – *continued*

Working with the fishers to develop the most appropriate measures can help to develop practical approaches. They will often be one of the most useful sources for monitoring compliance with the rules and, if they see no value in the proposed methods, getting compliance will be much harder to achieve, if not impossible.

## Source of information

Cochrane, K.L. (ed.). 2002. *A fishery manager's guidebook. Management measures and their application*. FAO Fisheries Technical Paper. No. 424. Rome, FAO. 231 pp. (Available at [www.fao.org/docrep/005/y3427e/y3427e02.htm](http://www.fao.org/docrep/005/y3427e/y3427e02.htm)).

Cato, J.C. 1998. *Economic values associated with seafood safety and implementation of seafood. Hazard Analysis Critical Control Point (HACCP) programmes*. FAO Fisheries Technical Paper. No. 381. Rome, FAO. 70 pp. (Available at <http://nsgd.gso.uri.edu/haccp/flsgph98002.htm>).

De Young, C.; Charles, A. & Hjort, A. 2008. *Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods*. FAO Fisheries Technical Paper. No. 489. Rome, FAO. 152 pp. (Available at [www.fao.org/docrep/010/i0163e/i0163e00.htm](http://www.fao.org/docrep/010/i0163e/i0163e00.htm)).

FAO. 1997. *Fisheries management. FAO Technical Guidelines for Responsible Fisheries*. No. 4. Rome, FAO. 82 pp. (Available at [www.fao.org/docrep/003/w4230e/w4230e02.htm](http://www.fao.org/docrep/003/w4230e/w4230e02.htm)).

FAO. 2007. *Report and documentation of the expert workshop on marine protected areas and fisheries management: review of issues and considerations. Rome, 12–14 June 2006*. FAO Fisheries Report. No. 825. Rome, FAO. 332 pp. (Available at <ftp://ftp.fao.org/docrep/fao/010/a1061e/a1061e.pdf>).

FAO. 1998. *Food quality and safety systems - a training manual on food hygiene and the Hazard Analysis and Critical Control Point (HACCP) System*. FAO Agricultural Policy and Economic Development Series 4. (Available at [www.fao.org/docrep/W8088E/W8088E00.htm](http://www.fao.org/docrep/W8088E/W8088E00.htm)).

FAO. 2008. *Fisheries management. 3. Managing fishing capacity*. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 3. Rome, FAO. 104 pp. (Available at [www.fao.org/docrep/011/i0318e/i0318e00.htm](http://www.fao.org/docrep/011/i0318e/i0318e00.htm)).

FAO. 2010. *Report of the FAO workshop on child labour in fisheries and aquaculture in cooperation with ILO. Rome, 14–16 April 2010*. FAO Fisheries and Aquaculture Report. No. 944. Rome, FAO. 24 pp. (Available at [www.fao.org/docrep/013/i1813e/i1813e00.pdf](http://www.fao.org/docrep/013/i1813e/i1813e00.pdf)).

FAO. 2011. *Report of the technical consultation to develop international guidelines on bycatch management and reduction of discards*. Rome, 6–10 December 2010. FAO Fisheries and Aquaculture Report. No. 957. Rome, FAO. 32 pp. (Available at [www.fao.org/docrep/013/i2024e/i2024e00.pdf](http://www.fao.org/docrep/013/i2024e/i2024e00.pdf)).

FAO. Quality and safety of fish and fish products. (Available at [www.fao.org/fishery/topic/1514/en](http://www.fao.org/fishery/topic/1514/en)).

FAO. Safety for fishermen. (Available at [www.safety-for-fishermen.org/en](http://www.safety-for-fishermen.org/en)),

FAO. Processing fish and fish products. (Available at [www.fao.org/fishery/topic/736/en](http://www.fao.org/fishery/topic/736/en)).

# Fishery management measures - manuals and reviews – continued



Huss, H.H; Ababouch, L & Gram, L. 2003. *Assessment and management of seafood safety and quality*. FAO Fisheries Technical Paper. No. 444. Rome, FAO. 230 pp. (Available at <ftp://ftp.fao.org/docrep/fao/006/y4743e/y4743e00.pdf>).

Kabahenda, M.K.; Omony, P. & Hüsken, S.M.C. 2009. *Post-harvest handling of low-value fish products and threats to nutritional quality: a review of practices in the Lake Victoria region*. Regional Programme Fisheries and HIV/AIDS in Africa: Investing in Sustainable Solutions. The WorldFish Center. Project Report 1975. (Available at [www.worldfishcenter.org/wfcms/file/SF0959SID/Programme%20Coordinator/Project%20Report%201975%20-%20208Dec09.pdf](http://www.worldfishcenter.org/wfcms/file/SF0959SID/Programme%20Coordinator/Project%20Report%201975%20-%20208Dec09.pdf)).

Pascoe, S.; Gréboval, D.; Kirkley, J. & Lindebo, E. 2004. *Measuring and appraising capacity in fisheries: framework, analytical tools and data aggregation*. FAO Fisheries Circular. No. 994. Rome, FAO. 39 pp. (Available at <ftp://ftp.fao.org/docrep/fao/008/y5443e/y5443e00.pdf>).

Tietze, U.; Houghton, M. & Siar, S.V. (eds). 2006. *Socio-economic indicators in integrated coastal zone and community-based fisheries management – case studies from the Caribbean*. FAO Fisheries Technical Paper. No. 491. Rome, FAO. 208 pp. (Available at <ftp://ftp.fao.org/docrep/fao/009/a0690e/a0690e00.pdf>).

## Other relevant references

Cochrane, K. & Garcia, S. 2009. *A fishery managers guidebook* (2nd Edition). FAO/Wiley-Blackwell. 536 pp.

Kennelly, S. (ed). 2007. By-catch reduction in the world's fisheries. Series, reviews, methods and technologies. In: *Fish Biology and Fisheries*, Vol. 7. Springer. 290 pp.

Quentin Grafton, R.; Hilborn, R.; Squires, D.; Tait M. & Williams, M. 2009. *Handbook of marine fisheries conservation and management*. Oxford University Press. 784 pp.



Photo: G. Bizzarri/FAO



# Fisheries enforcement and compliance

## EAF steps

**Activity 3.3 - Management option evaluation and selection**

**Activity 4.3 - Review performance of the management system**

## Purpose

Assist with the identification and development of enforcement and compliance strategies that will contribute to the effective implementation and operation of the management plan and achieve objectives.

## Overview

There are a small number of reports that have been published on how to improve enforcement. The most relevant of these are listed below.

**Fisheries enforcement. Related legal and institutional issues.** (Francks, 2001). The study in the report below attempts to identify the approaches taken by national governments and by sub-regional and regional fisheries bodies to contribute towards the implementation of the agreements. A special focus is put on monitoring, control and surveillance. The study found that, at national, sub-regional or regional level, there was no best or preferred method of implementation that would seem to fit all countries or all regional fisheries bodies. It is hoped that the analysis of different methods may provide guidance to governments in achieving the important objectives of the agreements.

**Compliance and enforcement for coastal fisheries management in Fiji.** (Minter, 2008). This research paper was commissioned by the University of the South Pacific (USP) Institute for Applied Sciences (IAS) to inform discussion about compliance and enforcement issues for coastal fisheries management in Fiji.

**Improving compliance in US federal fisheries.** (Randall, 2004). An enforcement agency perspective. Fisheries enforcement is frequently overlooked in the US federal fisheries management process, yet without fisheries enforcement, even the most robust fisheries management plan may fail. Coupling past studies of compliance in fisheries with studies of regulatory enforcement, this paper identifies several measures for increasing the effectiveness of US federal fisheries enforcement.

## EAF tool tips

This is often a forgotten part of the management system, yet without effective enforcement and reasonable compliance with the arrangements, the management plan is highly likely to fail.

## Source of information

Francks, E. 2001. *Fisheries enforcement: related legal and institutional issues. National, sub-regional or regional perspectives*. FAO Legislative Study 71. 137 pp. (Available at <ftp://ftp.fao.org/docrep/fao/007/y2776e/y2776e00.pdf>).

Minter, A. 2008. *Compliance and enforcement for coastal fisheries management in Fiji*. IUCN Regional Office for Oceania, Suva, Fiji. (Available at [http://cmsdata.iucn.org/downloads/fisheries\\_compliance\\_and\\_enforcement\\_081117.pdf](http://cmsdata.iucn.org/downloads/fisheries_compliance_and_enforcement_081117.pdf)).

Randall, J.K. 2004. Improving compliance in U.S. federal fisheries: an enforcement agency perspective. *Ocean Development and International Law*, 35:287–317.



# Management Strategy Evaluation (MSE)

## EAF steps

Activity 3.3 - Management option evaluation and selection

Activity 4.3 - Review performance of the management system

## Purpose

Management Strategy Evaluation (MSE) involves assessing the consequences of a range of different management strategies or options to determine which approach will be the most appropriate to meet the operational objectives of the fishery.

## Overview

MSE is a modelling based approach aimed at testing the robustness of possible management arrangements (plans) by examining which sets of decision rules – used to adjust TACs or effort controls – perform best in achieving the management objectives for a fishery. This simulation testing can also be used to determine how robust the management plan is likely to be to uncertainties. Such analyses enable the choice of the management planning option with the most reasonable likelihood of achieving the management goals.

The MSE process involves using (1) an “operating model” to represent the true underlying dynamics of the fishery resource and to generate simulated future data; (2) an estimation model to assess the state of the stock relative to agreed target and limit reference points based on the data simulated using the operating model; and (3) one or more decision rules to determine what management actions should occur (e.g. change the TAC), given where the indicator generated by the estimation model is in comparison to the reference points. The latter two steps constitute the management strategy (see also Harvest Strategy and Control Rules Fact sheet). The settings used in the management strategy can then be varied to best satisfy each of the often conflicting management goals and objectives. The outputs from the MSE are a set of performance measures that quantify the effectiveness of the estimation model and, more generally, a definition of what management/harvest strategy will best keep the fishery in the acceptable or target range of these levels.

## EAF tool tips

**Strengths:** The strength of the approach is that instead of using a single model to find an optimal solution, multiple candidate models can be assessed. By modelling each step of the formal adaptive-management approach the consequences of alternate scenarios can be evaluated across the models. The other core strength of the process is that it is consultative in that both managers and stakeholders can have input into the candidate models and management scenarios. As the approach demands clear objectives against which to measure the evaluations, the method forces participants to be clear about their objectives.

The MSE approach is also aimed at identifying management plans that are robust to natural variation in the system and to uncertainty and error, both in stock assessments and implementation. The analysis usually attempts to identify control rules/strategies that perform well under a variety of potential circumstances and with uncertainty in assessments.



# Management Strategy Evaluation (MSE) – continued

**Weaknesses:** The MSE approach is only as good as the underlying models and assumptions it is based on, including the extent to which the true range of uncertainty can be identified and represented in operating models. It has been noted (Rochet and Rice, 2009) that the use of complex mathematics and statistical tools risks giving users a false sense of rigor by implying a degree of precision and accuracy that may be misleading, particularly for low probability outcomes. If undesirable outcomes have not been experienced often enough to know the conditions that cause them, MSE may not bracket the range of possible outcomes and is unlikely to determine accurately the probability of their occurrence. So, caution is required in their use to ensure that they add to the robustness of decision making, rather than masking uncertainty.

## Source of information

Amar, T.; Punt, A. & Dorn, M.W. 2008. *Resiliency of gadid stocks to fishing and climate change*. 317 Alaska Sea Grant College Program. AK-SG-08-01: 317–346. (Available at [http://nsgl.gso.uri.edu/aku/akuw06005/akuw06005\\_part8.pdf](http://nsgl.gso.uri.edu/aku/akuw06005/akuw06005_part8.pdf)).

CSIRO, Australia. *Management Strategy Evaluation*. [www.cmar.csiro.au/research/mse](http://www.cmar.csiro.au/research/mse)

Holland, D.S. 2010. *Management strategy evaluation and management procedures: tools for rebuilding and sustaining fisheries, OECD food, agriculture and fisheries*. Working Papers, No. 25. OECD Publishing. (Available at [www.oecd.org/dataoecd/1/10/45497984.pdf](http://www.oecd.org/dataoecd/1/10/45497984.pdf)).

## Other relevant references

Butterworth, D.S. & Punt, A.E. 1999. Experiences in the evaluation and implementation of management procedures. *ICES Journal of Marine Science*, 56:985–998.

De la Mare, W.K. 1996. Some recent developments in the management of marine living resources. In: Floyd, R.B., Shepherd, A.W. & De Barro, P.J. (eds.). *Frontiers of Population Ecology*, 599–616. Australia. CSIRO Publishing.

IWC, 1992. Report of the Scientific Committee, Annex D. *Report of the sub-committee on management procedures*. Reports of the International Whaling Commission, 42:87–136.

Punt, A.E. & Smith, A.D.M. 1999. Harvest strategy evaluation for the eastern gemfish (*Rexea solandri*). *ICES Journal of Marine Science*, 56:860–875.

Rochet, M.J. & Rice, J.C. 2009. Simulation-based management strategy evaluation: ignorance disguised as mathematics? *ICES Journal of Marine Science*, 66:754–762.

Sainsbury, K.J.; Punt, A.E. & Smith, A.D.M. 2000. Design of operational management strategies for achieving fishery ecosystem objectives. *ICES Journal of Marine Science*, 57:731–741.

Starr, P.J.; Breen, P.A.; Hilborn, R. & Kendrick, T.H. 1997. Evaluation of a management decision rule for a New Zealand rock lobster substock. *Marine and Freshwater Research* 48(8):1093–1101.

Walters, C.J. 1986. *Adaptive management of renewable resources*. New York. MacMillan Publishing Co.

# Review of quantitative ecosystem models



## EAF steps

**Activity 2.2 - Issue prioritisation and risk assessment**

**Activity 3.3 - Management option evaluation and selection**

## Purpose

Specifically designed quantitative ecosystem models which can incorporate a large number of relevant variables and processes (e.g. biological, ecological, social and economic factors) can be used to simulate the implications and trade-offs of alternative management actions and trade-offs for the different, conflicting stakeholders or objectives at the level of the ecosystem. Two FAO reports review the ecosystem modelling methods currently available for completing these assessments. (Plagányi, 2007; FAO, 2008).

## Overview

The FAO reports found that a wide variety of ecosystem modelling methods are now available. They review the methods available for assessing the impacts of interactions between species and fisheries and their implications for marine fisheries management. A brief description of current modelling approaches is provided, highlighting in particular features of these models which have general relevance to the field of the ecosystem approach to fisheries (EAF). The report concentrates on the models currently available and representative of general types such as bioenergetic models, predator-prey models and minimally realistic models.

Short descriptions are given of model parameters, assumptions and data requirements. Some of the advantages, disadvantages and limitations of each of the approaches in addressing questions pertaining to EAF are discussed. The reports conclude with some recommendations for moving forward in the development of multi-species and ecosystem models and for the prudent use of available models as tools for provision of scientific information on fisheries in an ecosystem context.

## EAF tool tips

Because ecosystem/multispecies models can be complex and data and resources for data collection and model development are usually limited, the actual uncertainty involved in model application may be greater than would ideally be tolerated. Ecosystem models are not at the stage where a single such model could be selected as a "management" model (i.e. within, say, a management procedure) and reliably used at the tactical level to provide management recommendations in a particular case.

# Review of quantitative ecosystem models – *continued*

The choice of an appropriate model depends not only on the question to be addressed but also on other logistical constraints such as the capacity of people available, the associated costs and the collection of the necessary data. The various modelling approaches discussed are roughly compared giving consideration to the above. All these models require a reasonable to very large commitment in time and resources, so there needs to be a good and objective assessment of the relative benefit of moving down this path.

## Source of information

FAO. 2008. Fisheries management. 2. The ecosystem approach to fisheries. 2.1 Best practices in ecosystem modelling for informing an ecosystem approach to fisheries. FAO Fisheries Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 2, Add. 1. Rome, FAO. 78 pp. (Available at [www.fao.org/docrep/011/i0151e/i0151e00.htm](http://www.fao.org/docrep/011/i0151e/i0151e00.htm)).

Pitcher, T. & Cochrane K. 2002. *The use of ecosystem models to investigate multispecies management strategies for capture fisheries*. Fisheries Centre Research Reports. Canada. 10(2): 1198-6727. (Available at [www.fisheries.ubc.ca/publications/use-ecosystem-models-investigate-multispecies-management-strategies-capture-fisheries](http://www.fisheries.ubc.ca/publications/use-ecosystem-models-investigate-multispecies-management-strategies-capture-fisheries)).

Plagányi, É.E. 2007. *Models for an ecosystem approach to fisheries*. FAO Fisheries Technical Paper. No. 477. Rome, FAO. 108 pp. (Available at [www.fao.org/docrep/010/a1149e/a1149e00.htm](http://www.fao.org/docrep/010/a1149e/a1149e00.htm)).







# Operational plan template and checklist

## EAF steps

### Activity 4.1 - Develop an operational plan and monitor its progress

#### Purpose

To document all the relevant activities, both current and any additional activities, processes and resources that will be required to fully implement the proposed EAF Management Plan for the fishery.

#### Overview

The operational plan provides detail on the major activities, timelines and resource requirements (the who and how) for implementing the EAF Management Plan (the what and why). The following steps include suggestions for developing the operational plan for a fishery.

The process involves going through each of the high priority EAF issues, one by one, where a management system has been developed or where any actions are required. For each of these steps, it is necessary to determine precisely what activities and processes are involved. For most issues there will be a number of different activities that will need to be completed, often involving multiple people or sections.

- First develop a complete list of all the identified issues that are to be directly managed to ensure they will all be covered by the operational plan.
- Then, starting with the most important of the issues identified as part of the EAF planning process, clearly and precisely determine what needs to be done and by whom and by what date for this issue to be fully implemented. Then, move progressively to the next most important issue and repeat the process.
- While the management systems for some issues may seem to be the same (i.e. management and monitoring arrangements for two target species), keep them separate until it is clear that the activities to address them are completely identical - often there may be subtle but important differences. If they are ultimately found to be covered completely by the same activity then they can be combined.
- It may also be necessary to have some separation of activities based on whether there are different functional components to the fishery – inshore, offshore, inside EEZ, high seas, etc. Undertaking consultation may be very different for these diverse groups and separate activities may therefore need to be planned.
- The process should clearly identify where there are changes needed by the implementation or modification of legislation, regulations, licence conditions or policies. If so, these need to be scheduled in.
- The process should also identify the activities that may take place outside the scope or jurisdiction of the fisheries agency. In these circumstances it may require advising other government departments of the issues they should be dealing with. Such inter-departmental governance issues are often a high risk area.
- Once all the issues have been examined, the assignment of priorities and timelines should be undertaken by the relevant fisheries agency, in conjunction with any relevant advisory committee.



# Operational plan template and checklist – *continued*

## EAJ tool tips

- We have found it works best to make an Excel spreadsheet table that uses the headings from Table 1 as columns so that the information in the table can be sorted easily by category, priority, person, issue, etc.
- The only practical way to go through and generate the list of activities for each issue is by having a meeting with enough representatives from the fishery agency that all parts of their operations are covered. Each issue is then discussed in detail and there is agreement about what would need to happen for the identified task to be completed.
- It is vital that there is agreement by the fisheries agency about what activities are to be undertaken and who will do them. Clearly, if they don't agree they won't do it!
- It is also absolutely necessary that there is a realistic assessment of whether any identified new tasks can actually be accommodated by the available resources. Again, there is no point stating that something will be done if there are insufficient resources to do it. It is still useful to identify what must be done but it must also be documented that for this to occur more resources would be needed (either additional or re-directed).
- Given the size of many fisheries agencies, it is very likely that there will be too few resources to undertake all the identified tasks. That is why it is very important to have a priority rating for each task, including those that are currently being undertaken, and an indication of the risks of something not being done.
- This may identify some tasks that are currently being undertaken but have a lower priority and risk level than identified tasks that are not currently being done. Such situations may allow a shift in resources to occur.
- The process may identify that the proposed set of management arrangements are really not possible to implement with the available resources. In this case there should be a revision of expectations.



Photo: J. Issac/FAO

# Operational plan template and checklist – continued



## Table of categories and activities

**Table 1** Possible headings for use in the spreadsheet template

Heading category	Description
Elements and sub issues	The name of the management element and sub issue
Type of activity	What category of activity is this (see examples in Table 2)?
Current activities	Are there already activities being undertaken?
Current resources	What are the current resources available for this task?
Current status	What is the current status – ok, not ok?
Regulations/notices/ condition/fines	What legislation, etc. is needed for the activity/process to operate?
New activities	Are there new activities needed to enable the management of the issue to occur?
Additional resources	Are additional resources needed to undertake the new activities?
Training	Will this require training?
Priority	What overall priority does this activity have?
Risk of failure?	What could stop the activity being successful and how could you mitigate this?
Timeframes	What is the proposed timeframe for undertaking the activity?
Risk if not undertaken or fails?	What is the risk if this activity is not done in the required timeframe?

# Operational plan template and checklist – continued

**Table 2 Possible types of activities**

Note the types of activities listed below can be adjusted (split, renamed or new types) to suit the structure and activities of the relevant fisheries agency. They are only presented as a starting point.

Type of activity	Description of activities
Administration/ licensing	Includes the collection of fees, issuing of licences and basic administration activities
Compliance	Those that determine if vessels/licenses are complying with their license conditions. This could include VMS activities, onboard inspections, patrol vessel activities, inspecting vessel logs. Validating catch reports, etc.
Consultation	Those associated with consulting with industry, other stakeholders and other agencies
Observers	Those undertaken by onboard observers
Onshore monitoring	Monitoring the catches in port
Other agency	Activities that agencies other than the fishery agency would need to undertake
Ministry	Things that the fisheries Minister or their office would need to undertake
Policy/ management	The development of policies, management plans
Research	Generation of assessments on the status of the stocks, or other information needed to make policy
Training	Training staff, industry, etc.

## Source of information

Fletcher, W.J. 2010. *Planning processes for the management of the tuna fisheries of the western and central Pacific region using an ecosystem approach*. Forum Fisheries Agency, Honiara, Solomon Islands. Faciliator's Version 6.1 (Available at [www.fisheries-esd.com/a/pdf/eafm%20based%20guide%20for%20tmp%20development%20v6%201.pdf](http://www.fisheries-esd.com/a/pdf/eafm%20based%20guide%20for%20tmp%20development%20v6%201.pdf)).



# Examples of best practice management plans

## EAF steps

### Activity 4.2 - Formalisation of the management plan

#### Purpose

Many of the management arrangements needed to achieve the operational objectives will be of a restrictive or legal nature and therefore will have to be formalised into some form of management plan. For fisheries where this management plan needs to be a formal, legal document; often requiring parliamentary approval, this tool outlines the structure of management plans that have been successfully developed in a number of countries and can be used to guide development. This should increase the chances of having your plan approved/endorsed by government (including any required change in, or new, legislation and regulation) or other relevant authority.

#### Overview

Chapter 9 of FAO's *A fishery manager's guidebook* outlines the basic elements that should be in a fishery management plan (FMP) and how to design and structure this. The Appendix includes an example of a management plan that was presented in this chapter.

This report suggests that, at a minimum, FMPs should contain:

- a description of the fishery, especially its current status and any established user rights;
- the management objectives;
- how these objectives are to be achieved;
- how the plan is to be reviewed and/or appealed; and the consultation process for review and appeal.

#### EAF tool tips

One of the most basic requirements of FMPs is adherence to the internationally sanctioned United Nations Convention on the Law of the Sea (LOS Convention), the FAO Code of Conduct for Responsible Fisheries and the precautionary approach to management. As EAF is consistent with both these conventions, developing a management plan using these principles will ensure that they are recognized.

Note that national FMPs can be designed to manage fisheries for resources which, at least partially, are distributed in the high seas, or that are shared between two or more countries. Because these resources are not under the jurisdiction of a single nation the FMP, being a national instrument, will only be applicable within the EEZ of that nation. This does not mean that the FMP will be ineffective, but it does mean that the plan may have to define national objectives that are constrained by the objectives of other countries (see Code of Conduct, Paragraphs 6.12, 7.1.2 and 7.3.2). See also discussion on Scope in Activity 1.2.



# Examples of best practice management plans – continued

## Source of information

Cochrane, K.L. (ed.). *A fishery manager's guidebook. Management measures and their application*. FAO Fisheries Technical Paper. No. 424. Rome, FAO. 231 pp. (Available at [www.fao.org/docrep/005/y3427e/y3427e0b.htm](http://www.fao.org/docrep/005/y3427e/y3427e0b.htm)).

Die, D. 2002. Design and implementation of management plans. In: Cochrane, K.L. (ed.). *A fishery manager's guidebook. Management measures and their application*. FAO Fisheries Technical Paper. No. 424. Rome, FAO. 231 pp. (Available at [www.fao.org/docrep/005/y3427e/y3427e0b.htm](http://www.fao.org/docrep/005/y3427e/y3427e0b.htm)).

Hindson, J.; Hoggarth, D.D.; Krishna, M.; Mees, C.C. & O'Neill, C. 2005. *How to manage a fishery: A simple guide to writing a fisheries management plan*. Marine Resources Assessment Group (MRAG), London. 81 pp. (Available at [www.fmsp.org.uk/Documents/r8468/R8468\\_Guide2.pdf](http://www.fmsp.org.uk/Documents/r8468/R8468_Guide2.pdf)).

## Other relevant references

Examples of fishery management plans adopted in some countries are provided below. The New Zealand Ministry of Fisheries Web site has a knowledge basket that permits access to fisheries legislation and regulations.

Australian Fisheries Management Authority, Australia: [www.afma.gov.au](http://www.afma.gov.au)

Caribbean Fishery Management Council, United States: [www.caribbeanfmc.com](http://www.caribbeanfmc.com)

Ministry of Fisheries, New Zealand: <http://fs.fish.govt.nz>

Norway: [www.fisheries.no/resource\\_management/Area\\_management/Integrated\\_management\\_plans](http://www.fisheries.no/resource_management/Area_management/Integrated_management_plans)

## Appendix

**Example of a fishery management plan template** (extracted from Cochrane, 2002).

### The Barbados fisheries management plan

The Barbados Fisheries Act (1993–96) required the Chief Fisheries Officer to develop a management plan for the fisheries of Barbados. In 1997, the Fisheries Advisory Committee, in consultation with the fishing industry and the general public, completed the FMP. Although the fisheries of Barbados, like those of many other developing countries, are highly diverse, the government decided to develop a single management plan for all of them. This contrasts with many other countries where fisheries management plans are developed for individual fisheries. As a result, the fisheries management plan for Barbados has much broader goals than those found in other plans.

These goals appear at the beginning of the FMP document (Table 2) and include meeting human-nutrition, social and economic needs, while integrating fisheries policy within coastal zone management and considering traditional knowledge of fisheries and the special interests of local (coastal) communities. Other goals of the Barbados FMP are more commonly seen in other plans, such as maintaining or restoring populations to the levels that can produce maximum sustainable yields, promoting the use of selective fishing gear to minimize wastage and bycatch, researching, monitoring and controlling fishing operations and fish resources, protecting endangered species and fragile ecosystems and finally, cooperating with other nations in the management of shared, straddling and migratory stocks. The plan then contains an overview of the fishing industry which, includes the whole variety of fishing practices and resources found in the country: from shallow water trapping for reef fish and lobsters to oceanic gillnets for flyingfish, handlines and longlines for coastal and oceanic pelagics and hand gathering of sea urchins.

# Examples of best practice management plans – continued



There is a description of the fisheries management process used to develop and implement the FMP, and the need to link the FMP to the coastal zone management plan is identified. The plan describes the legislation that directly influences the plan, and includes a history of previous and existing bilateral fishing agreements with other nations. The next section of the plan defines the organizational framework of the fisheries sector in Barbados, including government and non-government fisheries related organizations and any fisheries programmes administered by international organizations. The section ends with a description of the research, monitoring, surveillance, licensing and inspection activities conducted in Barbados.

**Table 2 Outline of the Barbados Fisheries management plan**

- Guiding principles (mission, goals, fisheries policy and country profile)
- Fishing industry profile (overview of fisheries, fishing industry, intersectoral linkages)
- Fisheries management (fisheries planning process, coastal zone management, fisheries legislation, regional fishery agreements, organizational framework, research and statistics, monitoring control and surveillance, inspection, registration and licensing)
- Fisheries development (visions from harvest, postharvest and state sectors)
- Management and implementation for specific fisheries (one for each fishery)
- Fishery management options
- Glossary

The plan then presents an analysis of issues of importance to the harvest, postharvest and government sector. For each issue a series of optional management actions are identified and implementation strategies are proposed, including a description of resources required. An example of an important issue for the harvest sector is the lack of fisher and boat owner organizations. Possible actions to address this issue are to promote organizational development, provide incentives and training. Strategies to achieve these actions are, for example, to subsidize certain organizations and provide extension training in organizational development. Of course, the plan notes that to carry these out, funds and trainers will be required. Although the goals of the plan are broad, an in-depth analysis of all issues allows the government to address them one by one within the priority order established by the policies of the government of Barbados and as a function of the resources available for its implementation. It is expected that as some of these issues are resolved they would disappear from future versions of the plan. Again, the plan is a living document.

The final part of the FMP includes sub-plans for each of the eight major fisheries of Barbados. These sub-plans are brief, two to three pages long, and include concise descriptions of the target species, bycatch, ecology, fishery, management unit, resource status, catch and effort trends, specific management policies, objectives and approaches already in place for such fisheries and a list of development opportunities and constraints. This descriptive part is followed, as in the main part of the FMP, by a list of issues and the proposed actions identified to address them, together with the resources required. At the end of the plan there is a list, with non-technical descriptions, of fishery management options used in the FMP, and a glossary.



# Eco-labelling - third party certification

## EAF steps

### Activity 4.4 - Report, communicate and audit performance

#### Purpose

Increase public confidence in the fishery and the fish products that are generated by auditing the implementation of the management plan and checking that the outcomes of this implementation are meeting the required level of acceptability through external scrutiny.

#### Overview

Product certification and ecolabelling are tools that can be used to support fisheries management. These tools, while inter-related and serving the same goal, have important differences as currently applied in fisheries. Product certification is commonly a measure mandated by governments, often mutually agreed upon by regional fisheries management organizations, in order to ensure that only legally harvested and reported fish landings can be traded and sold in the domestic or international markets. The principal objective of product certification (and catch documentation) is to prevent, deter and eliminate illegal, unreported and unregulated fishing in accordance with the 2001 FAO International Plan of Action. Product certification does not necessarily involve a product label at the retail level. Where product certification comes with a label to inform consumers, however, it can influence consumers' choices.

#### EAF tool tips

The FAO review of ecolabelling schemes (Sainsbury, 2010) summarises the standards, requirements and practices for well-managed fisheries as applied through internationally-managed fisheries and through national management of fisheries. The standards, requirements and practices of existing fishery ecolabels are reviewed, including government-linked ecolabels, non-governmental ecolabels and seafood guides. Seafood guides are mostly ISO Type II or Type III ecolabels that provide self-declared claims or product descriptions against preset indices and so are not strictly comparable to the ecolabels covered by the FAO guidelines (FAO, 2009). However, these guides are reviewed in Sainsbury (2010) because they are increasingly widespread, sometimes used in business procurement policies, a source of information on public expectations about sustainable fisheries and some use the results of third party assessments.

The special requirements of the assessment of small-scale fisheries and developing countries, fisheries are considered. The primary difficulty in relation to ecolabelling of these fisheries is also the primary difficulty with their management: generally that the cost of monitoring, assessment and management can be out of proportion with the value of the fishery and/or beyond the human and infrastructure capacity that is available. However, ecolabelling requires evidence that is verifiable and auditable through third party assessment. Methods to develop, test and apply proxies, empirical indicators and risk-based assessments are available and have been applied in both small-scale and developing state fisheries. While these assessment and management approaches have not been widely applied and they require further development, they provide promising methods to manage fishery performance in circumstances where formal (statistical) estimation of stock condition is not possible.

# Eco-labelling - third party certification – continued

## Source of information

FAO. 2009. *Guidelines for the ecolabelling of fish and fishery products from marine capture fisheries*, Revision 1. Rome, FAO. 97 pp. (Available at [www.fao.org/docrep/013/i1948e/i1948e08.pdf](http://www.fao.org/docrep/013/i1948e/i1948e08.pdf)).

Sainsbury, K. 2010. *Review of ecolabelling schemes for fish and fishery products from capture fisheries*. FAO Fisheries and Aquaculture Technical Paper. No. 533. Rome, FAO. 93 pp. (Available at [www.fao.org/docrep/013/i1433e/i1433e00.pdf](http://www.fao.org/docrep/013/i1433e/i1433e00.pdf)).

Wessells, C.R.; Cochrane, K.; Deere, C.; Wallis, P. & Willmann, R. 2001. *Product certification and ecolabelling for fisheries sustainability*. FAO Fisheries Technical Paper. No. 422. Rome, FAO. 83 pp. (Available at [ftp://ftp.fao.org/docrep/fao/005/y2789e/y2789e00.pdf](http://ftp.fao.org/docrep/fao/005/y2789e/y2789e00.pdf)).

## Other relevant references

Marine Stewardship Council: [www.msc.org](http://www.msc.org)



Photo: G. Bizzarri/FAO



# List of acronyms

ABMs:	agent-based models
ADR:	alternative dispute resolution
$B_0$ :	virgin biomass
$B_{MSY}$ :	biomass at maximum sustainable Yield
BRD:	bycatch reduction device
C x L:	consequence x likelihood
CBA:	cost-benefit analysis
CBM:	community-based ecological monitoring
COFI:	FAO committee on fisheries
CPUE:	catch per unit of effort
CVM:	contingent valuation method
EAF:	ecosystem approach to fisheries
EBM:	ecosystem-based management
EEZ:	exclusive economic zone
ESD:	ecologically sustainable development
FMP:	fishery management plan
$F_{MSY}$ :	fishing mortality at the maximum sustainable level
GDP:	gross domestic product
GIS:	geographic information system
GPS:	global positioning system
GT:	gross tonnage
GVP:	gross value of product
ICAM:	integrated coastal area management
LME:	large marine ecosystem
M:	natural mortality rate
MCDA:	multi-criteria decision analysis
MCS:	monitoring, control and surveillance
MEY:	maximum economic yield
MODA:	multi-objective decision analysis
MPA:	marine protected area
MSE:	management strategy evaluation
MSY:	maximum sustainable yield
PME:	participatory monitoring and evaluation
PRA:	participatory rapid appraisal
PRCA:	participatory rapid community assessment
PSA:	productivity susceptibility assessment
RFMO:	regional fisheries management organization
SICA:	scale, intensity and consequence analysis
SWOT:	strengths, weaknesses, opportunities and threats
TAC:	total allowable catch
TCM:	travel cost method





[www.fao.org/fishery/eaf-net](http://www.fao.org/fishery/eaf-net)



# EAF Toolbox

## The ecosystem approach to fisheries

The Ecosystem Approach to Fisheries (EAF) has been adopted by the FAO Committee on Fisheries (COFI) as the appropriate and practical way to fully implement the Code of Conduct for Responsible Fisheries, including the ecological, social and economic elements of sustainability, thus addressing the main pillars of Sustainable Development. Special attention is also placed on governance as key to realize human and environmental sustainability goals.

To implement the EAF, a risk based management planning and implementation process is proposed, to be applied adaptively. The EAF Toolbox has been designed to guide users through each of the four main EAF management planning and implementation steps. At each step, guidance is provided on tools to help users decide which tool(s) could be most appropriate for each step given the type of fishery, their resources and capacity.



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