

Table 1: The **first step** in the implementation of the EAF is the **initiation/preparation**. The purpose of this step is to gather initial information and planning the participatory process consistent with the context (cultural, resources available, type of fisheries, etc.). The outputs from this step are an initial draft scoping document (broad summary of the nature of the fishery, the ecosystem, the fishing community, related coastal/marine industries and activities), a detailed project plan, and a draft communication plan.

Activities	Tools
<ul style="list-style-type: none"> • Project planning (people, time, budget, capabilities) • Construct the Project team (key requirements: facilitation & communication skills, planning expertise, social science, fisheries expertise, systems thinking, etc.) • Stakeholder analysis (definition, mapping, power relationship) • Publicity for self-identification of stakeholders and interested parties • Introductory consultations (independently and at multiple levels; identification of rules of engagement in the process) • Estimates of requirements of stakeholder for participation and broad project plan • Consideration of transparency and facilitation (roles in the process, independent chair/facilitator, etc.) • Communication planning (incl. setting expectations, making plans for feedback loops in planning process and forms of communication to be used) 	<p>Stakeholder analysis</p> <ul style="list-style-type: none"> • Commitment analysis • Community mapping • Essential questions at initiation phase to support scoping and project planning, including internal and external capacity assessment • Context specific facilitation guidelines and training tools¹ • Specific stakeholder analysis guidelines/approaches/software • Participatory² process for EAF from participatory process literature • Broad categories of useful information to have prior to stating the scoping phase <p>Project Management</p> <ul style="list-style-type: none"> • Project Cycle Management Commitment analysis • Professional facilitation • Lessons from experiences in other management processes in same country • Context specific facilitation guidelines and training tools • Due diligence study

¹ Literature review of available participatory guidelines from other fields [e.g. Philippine integrated coastal management (ICM), Great Barrier Reef Marine Park (GBTMP) papers, South American examples].

² Large literature in this area but currently specific guidelines/manuals not available for fisheries in particular. Needs to be tailored to specific audience.

Table 2: The **second step** in the implementation of the EAF is the **definition of the scope of the EAF process**. The purpose of this step is to define the scope of the social, economic and ecological system and to develop a shared understanding of the status and trends and of potential issues. The output from this step is an agreed scoping document that clearly defines what activities and sectors are to be included in the EAF process and the societal values that the community expects to be maintained or generated.

7

Activities	Tools
<ul style="list-style-type: none"> • Identification of key stakeholders for first workshop to ensure the credibility of the process • Identification of goals and objectives of community and sharing these before hand in a way that informs but doesn't constrain the process • Preparation of background documents including relevant national legislation and policy and international agreements • Definition of the scope of management system as it relates to the ecological and fisheries activity • Identification of other activities/influences on the system aside from fishing to elaborate on the background document • Socio-economic summary of region and relative importance of fishing; • Summary of management and research capacity 	<p>Initial stakeholder engagement</p> <ul style="list-style-type: none"> • Participatory community rapid assessment (PCRA) and facilitation approach • PCRA approaches to social and economic indicators • Vision exercises • Education material explaining relationship/history/rational of EAF. • Data mining/GIS/spatial analysis for social, economic and environmental data sets

Table 3: The **third step** in the implementation of the EAF is the **identification of issues and, amongst them, those that need to be managed**. The purpose of this step is to define the scope and priority of issues to be managed within the context of the EAF plan and to provide avenues to pursue those that cannot be managed within the scope of the EAF process. The outputs of this step is a complete set of EAF issues that are relevant to the fishery being examined plus the relative priority of each of these issues to determine what direct management actions or other activities they require.

Activities	Tools
<ul style="list-style-type: none"> • Identify the scope of specific issues to be managed in the EAF process (make explicit that this includes direct and indirect impacts of fishing) • Identify those issues that are external to the fisheries management system and identify the most appropriate mechanism to address them outside the fisheries management system • Prioritization of issues and comprehensive analysis of the relationships among issues (e.g. interactions among issues and their relationship with objectives) • Cross-validation of views from stakeholder workshop with analysis of available information 	<p>Identification of Issues</p> <ul style="list-style-type: none"> • Broad stakeholder workshops; surveys, focus groups; individual discussions, brainstorming • Resource use patterns and trends³ • Use of simple conceptual models to develop understanding of how the fishery and ecological system work • Spatial analysis of overlap in resource use • Modification of generic EAF component trees – ESD How to Guide⁴ and EAF Tuna Guide⁵ • Means of capturing alternative conceptual models and values of the stakeholder groups (e.g., key questions to ask to prompt people to flesh out component trees into values/assets) • Comparison to checklists <p>Prioritization of issues</p> <ul style="list-style-type: none"> • Value scoring, pair-wise comparison, ranking and sorting exercises, “spending your budget/sticky dots”; anonymous rankings • Risk assessments – ESD ‘How to Guide’ (Qualitative – ecological and social); EAF Tuna Guide, (Qualitative – ecological, social and economic issues) Commonwealth ERA (Qualitative – Quantitative ecological)⁶ • Multicriteria decision analysis (MCDA) – Kiker <i>et al.</i> 2005⁷; • Expert systems • Qualitative modelling (e.g., Dambacher <i>et al.</i>)⁸.

³ Town Resource Cluster analysis spatial analysis of resource, employment, demography, been developed for fisheries and multiple-use application in Great Barrier Reef Mark Fenton James Cook University, (http://www.reef.crc.org.au/research/fishing_fisheries/commercial.html)

⁴ National ESD Reporting Framework - How To Guide http://www.fisheries-esd.com/a/pdf/WildCaptureFisheries_V1_01.pdf

⁵ A Guide to Implementing an Ecosystem Approach to Fisheries Management (EAFM) for the tuna fisheries of the Western and Central Pacific Region <http://www.fisheries-esd.com/a/pdf/FFA%20-%20EAFM%20Guide.pdf>

⁶ Commonwealth ERA http://www.afma.gov.au/environment/eco_based/eras/docs/fact_sheet.pdf

⁷ Application of Multicriteria Decision Analysis in Environmental Decision Making (http://www.allenpress.com/pdf/ieam-01-02_95_108.pdf)

⁸ Dambacher, J.M., H.W.Li and P.A. Rossignol. (2003) Qualitative prediction in model ecosystems. *Ecological Modelling* 161: 79–93

Table 4: The **fourth step** in the implementation of the EAF is the **development of operational objectives**. The purpose of this step is to define and prioritize the ecological, social, economic and institutional objectives to be pursued in the EAF process. The output of this step is the formulation and agreement on the operational objectives appropriate for each of the high priority issues that require direct management activities.

Activities	Tools
<ul style="list-style-type: none"> Draft possible operational objectives based on higher level objectives and legal constraints. This could be done by the Fisheries Management Agency or by a committee. If the objectives are not already identified, literature reviews or experience can be used to determine possible operational objectives, preferably based on best practices applicable to the context 	<p>Identification of objectives All EAF issues (target, ecosystem, social, economic)</p> <ul style="list-style-type: none"> ESD Assessment Manual⁹ (This includes a table of possible objectives for ecological, economic and social issues), EAFM guide for tuna (this includes standard objectives for target, non target, ecosystem, social and economic issues), FAO guidelines on EAF (Includes general objectives), Ecolabelling assessment reports (MSC guidelines include generic objectives for target, non-target and ecosystem issues) <p>Target species:</p> <ul style="list-style-type: none"> Review publications and manuals outlining possible objectives and acceptable performance (e.g. Biomass > B_{MSY}; B_{MEY} etc.); Hilborn and Walters (2003) , Gabriel and Mace (1999); Quinn and Deriso (1999), Walters and Martell (2004) <p>Bycatch species and ecosystem objectives:</p> <ul style="list-style-type: none"> FAO papers – a number are available in various bycatch action plans <p>Social objectives</p> <ul style="list-style-type: none"> Bureau of Rural Science Guide to Social Assessments¹⁰ (This is a comprehensive guide of methods for assessing social well-being; includes commentary on suitability of each method for different purposes.) <p>Economic objectives:</p> <ul style="list-style-type: none"> Valuing Fisheries (Tor Hundloe [2002])¹¹
<ul style="list-style-type: none"> Determine the hierarchy if there are more than one objective Determine who will be involved in this decision and what criteria will be used to decide the hierarchy of objectives 	<ul style="list-style-type: none"> Conflict resolution Consensus building Multicriteria Decision analysis
<ul style="list-style-type: none"> Review objectives to ensure they are not inconsistent with legislation Have stakeholders agree that the operational objectives are appropriate 	<ul style="list-style-type: none"> Legal analysis Network analysis Institutional analysis

⁹ ESD Assessment Manual - http://www.fisheries-esd.com/a/pdf/AssessmentManualV1_0.pdf

¹⁰ Social Assessment Handbook –A guide to methods and Approaches http://www.fisheries-esd.com/a/pdf/Social_Assessment_Handbook.pdf

¹¹ Hundloe, T.J., (2002). Valuing Fisheries: An Economic Framework, University of Queensland Press, Queensland.

Table 5: The **fifth step** in the implementation of the EAF is the **identification of indicators and the choice of performance limits**. The purpose of this step is to define the ecological, social, economic and institutional indicators that will be used to gauge the success of the EAF process. The output of this step is the completion of the processes to identify what is acceptable performance for each of the issues requiring management and how these can be monitored and reviewed.

Activities	Tools
<ul style="list-style-type: none"> • Examine possible indicators of performance for the operational objectives • Review what data/information is available. • Determine if there is sufficient data/information to use the indicator to measure if the operational objective is reached • If there is insufficient data/information, use the literature/experience to assist in determining what are the possible indicators given the resource available. Indicators can be quantitative or qualitative • If appropriate and possible develop control rules or harvest strategy • Determine time scale for reviews 	<p>All EAF issues:</p> <ul style="list-style-type: none"> • Potential indicators and performance measures: ESD Assessment Manual (This manual includes methods to assist develop appropriate performance measures and indicators for all EAF issues – plus it includes a set of possible combinations covering situations with low and high levels of information), FAO guidelines on EAF, Ecolabelling assessment reports, precautionary approach; FAO Guide on Indicators¹² (provide information on the type of indicators and related reference points needed for sustainable development) <p>Target species – single species:</p> <ul style="list-style-type: none"> • Review publications and manuals that outline Indicators and performance measures (e.g. Biomass > B_{MSY}/ B_{MEY} etc.), <p>Multiple target species indicators:</p> <ul style="list-style-type: none"> • Northern Demersal Scalefish Interim Managed Fishery (NDSF) paper¹³ <p>Bycatch species and ecosystem issues :</p> <ul style="list-style-type: none"> • FAO paper; some papers that outline potential ecosystem indicators, several databases are available on ecological attributes, See Link <i>et al.</i>¹⁴, FishBase¹⁵, sea life base¹⁶ <p>Social issues:</p> <ul style="list-style-type: none"> • Potential indicators listed in: BRS Guide to social assessments, socioeconomic fisheries surveys in Pacific islands (SPC)¹⁷ <p>Economic issues:</p> <ul style="list-style-type: none"> • A number of technical papers on economic indicators, potential indicators in valuing fisheries (Hundloe), socioeconomic fisheries surveys in Pacific islands (SPC). <p>Governance Issues:</p> <ul style="list-style-type: none"> • Legal analysis, network analysis, institutional analysis

¹² <http://www.fao.org/docrep/004/x3307e/x3307e00.htm>

¹³ <http://www.fish.wa.gov.au/docs/pub/FONorthDemersalScaleFish/fo003.pdf>)

¹⁴ J. Link Translating ecosystem indicators into decision criteria ICES Journal of Marine Science 2005 62(3):569–576

¹⁵ <http://www.fishbase.org/home.htm>

¹⁶ <http://fishbase.sinica.edu.tw/SLP/search.php>

¹⁷ http://www.spc.int/coastfish/Fishing/SocioEco_E/SocioEco_E.htm

Table 6: The **sixth step** in the implementation of the EAF is the **development and evaluation of the management options**. The purpose of this step is to identify portfolios of management measures and evaluate their usefulness to achieve the ecological, social, economic and institutional objectives pursued by the EAF process. The output of this step is an agreed set of management arrangements that will be used to generate acceptable performance for each of the EAF issues requiring management, plus an understanding of how these issues interact.

Activities	Tools
<ul style="list-style-type: none"> • Identify possible management portfolios. Finding the right combination of management actions and arrangements to generate acceptable performance for specific (and potentially other) issues/objectives based on the perceived uncertainty • The possible actions/measures include spatial, technical and temporal measures as well as input and output controls • Incentives (social, economic, penalties, institutional), legal (legislative institutional arrangement, etc.) • This process can be done by the agency or in consultation with stakeholders. The initial selection of options should be done by first doing a review of the current system, the context in which it is operating and if the current performance is acceptable • Transition arrangements have to be developed if the current arrangements are not satisfactory • Other options can be examined/developed based on assessment of what has worked or not worked elsewhere in similar situations 	<ul style="list-style-type: none"> • All: human dimensions TP (FAO), State of world’s marine capture fisheries management. (FAO)¹⁸, community-based management¹⁹, market analysis • Regulation of fishing gear²⁰ • Target species: A number of reviews of input versus output controls • Bycatch: books and reports on how to minimize interactions with seabirds, grids, TEDs²¹ • Ecological: books and reports on how to use spatial, temporal, gear/method • Governance/administration: consultation processes , co-management, rights based (FAO), ecolabelling
<ul style="list-style-type: none"> • Evaluate the management portfolios to determine the “best” option. If it is not possible to implement the “best” options due to lack of resources or lack of political will, it is necessary to choose another combination or go back to the identification of objectives and agree on objectives that are reachable given the resources and political will 	<ul style="list-style-type: none"> • Cost-benefit analysis, multicriteria analysis²², management strategy evaluations (MSEs), bioeconomic models, expert systems, scenario analysis, quantitative models (Lots), etc.²³
<ul style="list-style-type: none"> • Assess the impact of the “best” option on other issues and the related objectives within the scope of this “fishery” – minimize or recognize any additional impacts on other elements of the system 	<ul style="list-style-type: none"> • Integrated assessments models (e.g. Atlantis), expert/stakeholder involvement/review, cost-benefit analysis, multicriteria analysis, management strategy evaluations (MSEs)²⁴, bioeconomic models, expert systems, scenario analysis, qualitative modelling , risk assessment, quantitative models
<ul style="list-style-type: none"> • Confirm or review the management portfolio “best” option and have the decision making Authority confirm the option. 	

¹⁸ <http://www.fao.org/docrep/009/A0699e/A0699e00.htm>

¹⁹ SPC in Pacific has many articles on this e.g. http://www.spc.int/coastfish/Fishing/Community_E/Community_E.htm

²⁰ Bjordal, A. (2002). The use of technical measures in responsible fisheries: regulation of fishing gear. FAO Tech Paper 424: 21–48

²¹ FAO has many papers on this e.g. <ftp://ftp.fao.org/Fl/DOCUMENT/rebyc/a1008e.pdf>

²² <http://www3.interscience.wiley.com/cgi-bin/summary/117354273/SUMMARY?CRETRY=1&SRETRY=0>

²³ FAO review of EAF models <http://www.fao.org/docrep/010/a1149e/a1149e00.htm>

²⁴ CSIRO MSE work <http://www.cmar.csiro.au/research/mse/atlantis.htm>

Table 7: The **seventh step** in the implementation of the EAF is to **formalize the management system**. The purpose of this step is to define in detail what needs to be done by whom how and where in order to implement the EAF process. The output of this step is the formal adoption and implementation of the management arrangements required for the fishery to achieve acceptable performance for each of its priority EAF issues.

Activities	Tools
<ul style="list-style-type: none"> • Develop the management plan based on confirmed option including any legislation needed • Have “plan” passed by government or relevant authority 	
<ul style="list-style-type: none"> • Develop implementation plan. Analysis of plan as to what needs to change or be done in addition to what is already being done and what no longer needs to be done • Clearly identify roles and responsibilities (and resources) for undertaking each activity required to achieve the plan • Develop operational plans for each of the groups (e.g. research group, compliance group, policy group, industry, information management) • Develop communications plans • Agree on time scales for review of each element • Establish the consultation and review processes (including external audit) and its TOR including the adaptive management environment for this (potentially) 	<ul style="list-style-type: none"> • EAFM Guide to WCPFC Tuna (has a chapter to assist develop an EAF implementation plan) • Communication • Target species • Spatial measures • Information management
<ul style="list-style-type: none"> • Execute plan²⁵. undertake the activities, enforcement and accountability, communication, buy-in by stakeholders • Adjust the systems used issue the authorizations to fish, to monitor the development of the fishery at the appropriate spatial and temporal scales (daily, weekly, monthly), to conduct the research in support of the plan • Issue the authorizations to fish with the appropriate conditions • Communicate the plan • Make available information on the development of the fishery at the appropriate spatial and temporal scales, possibly through a web site or other means as appropriate • Organize monitoring and train the monitors, including observers at sea and dock side monitors if appropriate • Adjust management measures within the scope of the plan as necessary (trip and bycatch limits, areas closed, etc.) • Monitor and approve the transfer of fishing entitlements • Review the harvesting, monitoring and fishery information and assess the progress of the fishery against the management plan objectives 	<ul style="list-style-type: none"> • Extension tools, VMS, Enforcement tools , information networks, capacity building, communication tools • Monitoring tools • Fleet sampling/surveys
<ul style="list-style-type: none"> • Reviewing progress (based on time scales identified). Undertake a review of operation plan (have you done you said in the operational plan) • Undertaking a review of the status of the indicators against the agreed performance measure • Has this achieved the performance against the objective that is specified in the plan • Document outcomes and knowledge • Adaptive management: analyse outcomes and determine what elements of the plan need to be reviewed (and how well the tools operated) 	<ul style="list-style-type: none"> • Create a learning environment (institutional learning), Books on adaptive management, Harvest Strategy Policies, Adaptive co-management, etc., interactive Web page

12

²⁵ The detailed list of activities below is adapted from input provided by Bruce Turriss after the meeting.

Table 8: The following is a list of the available manuals, guides and frameworks that cover all/most of the steps of EAF in a comprehensive manner.

Tools	Comments
National ESD How to Guide for Australian Fisheries	<p>Provides a step by step guide to complete an ESD (EAF) assessment and generate appropriate management systems for wild capture fisheries. The issues it covers include all ecological elements (retained non-retained species plus the general ecosystem) social and economic issues plus governance and external drivers. The manual is written for use by fisheries agency staff and requires a moderate level of background understanding. The main target fisheries covered are commercial fisheries.</p> <p>Cost – Low- Moderate; Complexity – Moderate; Knowledge – Moderate ;Participation- Moderate Timeframe – Short – Moderate</p>
EAFM Guide for Tuna Fisheries in the Western Central Pacific Fisheries Commission	<p>This step-by-step guide has been developed to assist countries in the Pacific region develop EAF assessments and management plans for their tuna fisheries. It is based on the Australian system but it has been updated and modified to target the types of issues and circumstances relevant to these countries and these types of fisheries. It focuses on identifying the scope of the fishery, especially the social and economic issues, and includes options for the complexity of risk analysis used. It provides options for the level of detail in reporting and outlines how to generate operational plans to implement the management systems developed.</p> <p>Cost – Low; Complexity – Low – Moderate; Knowledge – Low - Moderate ; Participation- Moderate - High Timeframe – Short - Moderate</p>
FAO. Fisheries management. 2. The ecosystem approach to fisheries http://www.fao.org/DOCREP/005/Y4470E/Y4470E00.HTM	<p>These guidelines were produced to supplement the FAO Code of Conduct for Responsible Fisheries and translate the high-level policy goals into action. It outlines the key steps involved in undertaking the EAF processes and identifies some of the issues that may affect its completion. It provide a valuable overview of the EAF rather than being a highly technical report and refers to other publications where required.</p>