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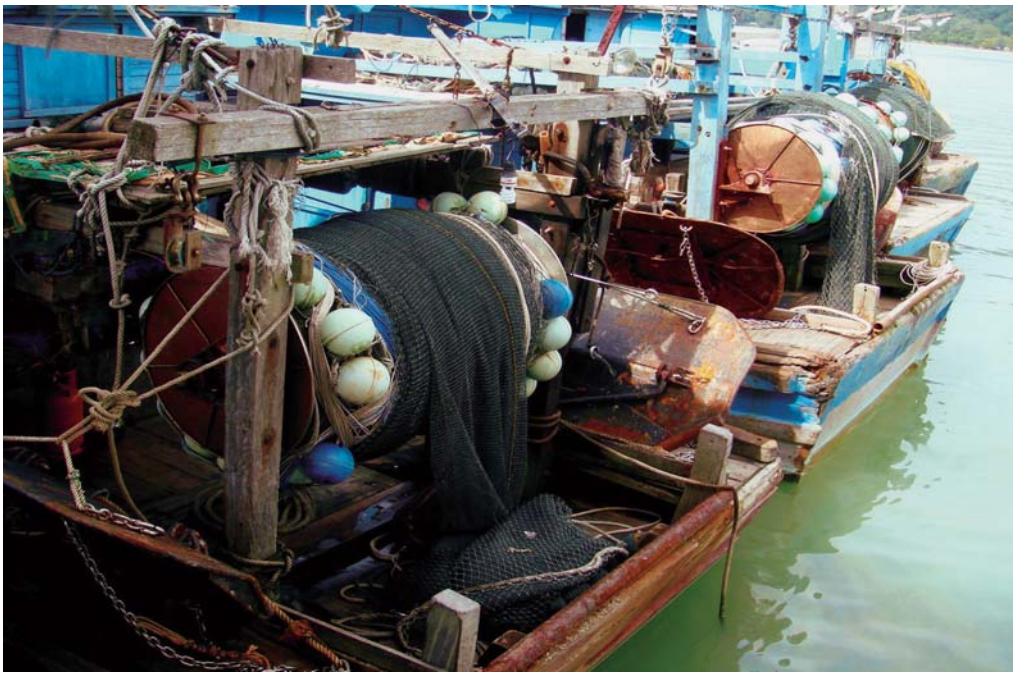
APFIC/FAO REGIONAL CONSULTATIVE WORKSHOP

Strengthening assessment of fisheries and aquaculture in the Asia-Pacific region for policy development

Yangon, Myanmar, 4–6 October 2011



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ASIA-PACIFIC FISHERY COMMISSION (APFIC)

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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FOREWORD

At its 31st Session, the Asia-Pacific Fishery Commission (APFIC) noted the need to strengthen fishery and aquaculture management in the region and encouraged member countries to undertake assessments where possible to assist fishery and aquaculture management decision-making. APFIC further emphasized the need to implement lower cost fishery assessment methods that are not heavily reliant on survey cruises, and to develop assessment techniques for data-poor, small-scale fisheries based on qualitative data and the use of risk-based approaches. It also recalled the need for improved management of aquaculture at the farm and sector level. As part of APFIC's goals to support dialogue and improve understanding of key fisheries issues of common interest to the Asia-Pacific region, the 31st Session of APFIC identified the need to organize a workshop on "Strengthening assessment of fisheries and aquaculture in the Asia-Pacific region for policy development". In response, a regional consultative workshop was convened which brought together 58 participants from APFIC member countries and from competent regional organization partners to discuss, consult on, and influence the region's efforts to develop and apply various types of fishery-related assessments to support the fisheries management process.

The workshop reviewed how existing capture fisheries assessment approaches can contribute to the different phases of the fisheries management process. The workshop also considered how to help develop standards for environmental impact assessments (EIAs) and footprint type activities to support ecosystem approaches to aquaculture sector management. In particular, the workshop addressed how these assessment methods could be tailored to the characteristics of fisheries/aquaculture within the region (especially small-scale fisheries) to facilitate the sharing of learning experiences and contribute to the increased use of lower cost assessment tools.

The workshop report contains a priority list of recommendations on how the use of lower cost assessment tools can be applied appropriately in data-poor, small-scale fishery/aquaculture situations that are characteristic of the region. It also identified the capacity building needs to support this. This workshop was therefore an important step in building regional capacity to assess the management conditions and needs of the aquaculture and fisheries sectors. In particular, it established a foundation for further work on developing technical guidance on methods as well as formulating and implementing pilot level fishery management plans in member countries.

Hiroyuki Konuma
Assistant Director-General and
Regional Representative for Asia and the Pacific

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ABBREVIATIONS

APFIC	Asia-Pacific Fishery Commission
ASEAN	Association of Southeast Asian Nations
BFAR	Bureau of Fisheries and Aquatic Resources, Philippines
BMP	Better Management Practices
BOBLME	Bay of Bengal Large Marine Ecosystem Project
CCRF	FAO Code of Conduct for Responsible Fisheries
CIM	Center for International Migration and Development
CPUE	Catch Per Unit Effort
CSR	Corporate Social Responsibility
CTI	Coral Triangle Initiative
DA	Philippines Department of Agriculture
DENR	Philippines Department of Environment and Natural Resources
DILG	Philippines Department of Interior and Local Government
DOF	Department of Fisheries
EAA	Ecosystem Approach to Aquaculture
EAF	Ecosystem Approach to Fisheries
EIA	Environmental Impact Assessments
EIS	Environmental Impact Statement
EPRMP	Environmental Performance Report and Management Plan
ETP	Endangered, Threatened and Protected (Species)
FADs	Fish Aggregating Devices
FAO	Food and Agriculture Organization of the United Nations
FAO RAP	FAO Regional Office for Asia and the Pacific
FEP	Fishery Ecosystem Plan
FIPP	Fishery Improvement Planning Process
FMP	Fishery Management Plans
GEF	Global Environment Facility
GSRS	Global Standard for Responsible Supply (IFFO Standard)
IEE	Initial Environmental Examination
IFFO	International Fishmeal and Fish Oil Organization
IRA	Import Risk Analysis
IUCN	International Union for the Conservation of Nature
IUU fishing	Illegal, Unreported and Unregulated Fishing
JAO	Joint Administrative Order
M&E	Monitoring and Evaluation
MCS	Monitoring, Control and Surveillance
MPA	Marine Protected Area
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NACA	Network of Aquaculture Centres in Asia-Pacific
NOAA	National Oceanic and Atmospheric Administration (United States)
PI	MSC Performance Indicators
PRA	Participatory Rural Appraisal

PSA	Productivity Susceptibility Analysis
REBYC-II	FAO/GEF Project "Strategies for Trawl Fisheries Bycatch Management" (GCP/RAS/269/GFF)
RFLP	Regional Fisheries Livelihoods Programme (GCP/RAS/237/SPA)
RPOA	Regional Plan of Action
SEAFDEC	Southeast Asian Fisheries Development Center
SG	MSC Scoring Guideposts
SIDA	Swedish International Development Agency
SFP	Sustainable Fisheries Partnership
SSF	Small-Scale Fisheries
TAAD	Transboundary Aquatic Animal Diseases
TSV	Taura Syndrome Virus
WTO SPS	World Trade Organization Sanitary and Phytosanitary Agreement
WWF	World Wide Fund for Nature

SUMMARY OF RECOMMENDATIONS

The outputs of the various working groups were compiled and then summarized to produce a series of concrete recommendations. These recommendations were reviewed in plenary by the workshop participants and adopted during the final plenary session at the end of the workshop.

CAPACITY BUILDING

There is a strong need for capacity building to support the implementation of the Fishery Improvement Planning Process (FIPP), the development of Fishery Management Plans (FMP) and the use of assessment tools for aquaculture planning. There is concern in many countries about whether it will be possible to continue to develop and attract human resources (fisheries scientists and managers) into management of the fisheries sector in the future, especially in wild capture fisheries. The number of students entering training in the fishery sector and being retained to work in the sector has been declining for some time.

Workshop recommendations

Encourage the exchange/sharing of regional transnational knowledge in management planning processes for transboundary fisheries and/or fisheries with similar characteristics.

Identify/establish a regional centre of excellence e.g. FAO APFIC in collaboration with non-governmental organizations (NGOs) and others such as the Southeast Asian Fisheries Development Center (SEAFDEC).

Create a regional and national pool of experts that would facilitate the development of plans.

Strengthen the knowledge of decision-makers.

Build more effective fisher organizations within the sector.

Governments should initiate capacity building, but the responsibility for carrying out capacity building activities should be decentralized and should involve many stakeholder groups.

Make greater effort to update fisheries curricula, to ensure and incentivize the entry of professionals into capture fisheries research and management, and to support the retention and ongoing training of fisheries professionals (potentially through regional training initiatives and sharing of training materials).

THE NEED TO PROMOTE FISHERY MANAGEMENT PLANNING

Assessments show that many fishery resources in the region are fully fished or overfished, particularly demersal fisheries. The increasing importance of combating illegal, unreported and unregulated (IUU) fishing and of conforming to importing country regulations and consumer sustainability requirements and the demands made by seafood trading interests is requiring a greater focus on effective fishery management. Sustainable sourcing is increasingly necessary because of NGO activity and growing consumer concerns. This makes business sense because it helps to ensure the long-term sustainability of supplies and because it meets the public's demand for companies to prioritize corporate social responsibility (CSR). The increasing demand for food safety and the origins of the fishmeal in aquaculture feeds is going to require improved traceability and other food safety related reporting. A major issue for the industry in the region is the increasing need to prove there is no IUU fish going into the fishmeal and that the product is pure and safe (without contamination/adulteration).

The workshop agreed that countries in the region generally already have national level management plans that follow the FAO Code of Conduct for Responsible Fisheries (CCRF) and the Ecosystem Approach

to Fisheries (EAF). However, national strategies are often too broad to address specific areas or fisheries. In some cases they may even be contradictory. It was acknowledged that fishery researchers make recommendations to politicians, but commercial fishers' lobbies are very strong and this often prevents scientists' recommendations from being acted upon by governments. This constrains effective management decision-making. National governments set fishery-specific strategic priorities for implementation of management planning, but actions are typically delegated to provincial authorities where appropriate.

The workshop agreed that there is a need to strengthen fishery management because of:

- the current poor status of fish stocks and the need to ensure sustainability to preserve the livelihoods of fishing communities;
- the need to minimize the negative impacts on the ecosystem;
- the need to establish specific activities that conform to a Fishery Management Plan (FMP);
- the need to provide a basis to monitor and evaluate the agreed management outcomes; and
- the different management styles and needs of domestic and export fisheries.

Workshop recommendation

Prioritization of key fisheries (e.g. economic, importance or source of conflict/risk of collapse) to be targeted for a Fishery Improvement Planning Process (FIPP). This may be at national or subnational level. Some transboundary stocks may be good candidates for FIPP if there is a strong economic reason for joint action.

FISHERY IMPROVEMENT PLANNING PROCESS (FIPP)

Many fishery management efforts are not well coordinated and have unclear or conflicting objectives. The workshop agreed that the *FIPP is a useful tool* for strengthening management as it offers a *structured planning process* that helps to generate an *FMP*.

The workshop was informed that there are examples within and outside the region of FIPP and other planning processes using the FIPP approach or similar approaches that are well advanced and have made measurable improvements in management performance.

FIPP or other tools presented in the workshop may be useful and appropriate for local level fisheries-specific management planning. This planning process is highly applicable to inland fisheries. The FIPP is used for a variety of outcomes such as to foster business-to-business certification and co-management.

Workshop recommendation

In order to further understanding and build capacity in the Fishery Improvement Planning Process (FIPP), a manual on how to implement the FIPP should be developed.

DEVELOPING FISHERY MANAGEMENT PLANS (FMPs)

The workshop noted the differing content of FMPs and that many were derived from other regions. It was agreed that some more specific guidance for Asia that drew on the regional context would assist in promoting understanding and application of FIPP.

Workshop recommendation

Create a regionally consistent structure for developing FMPs that is flexible enough to allow for country specific actions.

An FMP that is developed through the FIPP incorporates the following key components:

Information

There is a need for better and more cost-effective ways of collecting data. Information on vulnerable species, and bycatch or resources that are not directly targeted by the fishery needs to be strengthened as part of the commitment to better data collection.

> ***Workshop recommendation***
>
> *Make greater use of data from commercial fishing vessels, logbooks/catch certificates and scientific observers on commercial vessels. Work with landing sites and use of middlemen for small-scale fishers. Provide basic services to incentivize data provision by the private sector (incentives include technical advice, selective gear, ice) in exchange for information at landing sites. There is a general need to overhaul statistical systems to support fishery management.*

Stock assessment

The first step has to be to understand better the state of the problem and here knowledge of stock status is critical. Stock assessment is not critical to the FIPP, and most people know that there are problems and a need for precautionary measures, but stock assessment will become important as an FMP is implemented, or reviewed or updated. Stock assessment could be used and applied at different levels – both using formal data-rich methods as well as data-deficient methods such as productivity susceptibility assessment (PSA).

> ***Workshop recommendation***
>
> *The integration of local knowledge in assessment is critical and can add value to data-deficient techniques, such as PSA. There should be a continuous commitment to national and regional capacity building in stock assessment techniques.*

Management strategies

There is a strong need for multi-species and multi-gear strategies that reflect mixed tropical fisheries. Transboundary management enshrines national and regional obligations to ensure compliance. Transboundary bilateral management agreements or the use of subregional bodies are important in establishing management strategies, but management tools could remain independent. Strengthening systems of allocating fishing rights as a management tool should acknowledge that both traditional and commercial rights are important in ensuring buy-in to the plan. If necessary, addressing problems of open-access through removing the system of open access by means of licensing/registration may be an appropriate management tool.

> ***Workshop recommendation***
>
> *The management strategy should be linked to the stock status and incorporate a number of management tools which are appropriate for tropical fisheries. A regional manual on appropriate management measures should be developed to support this.*

Ecosystem Approach to Fisheries management (EAF)

Risk analysis undertaken to assess the impacts of fisheries on ecosystems and their ecosystem effects, needs to ensure that management actions deal with all at-risk species such as vulnerable target and non-target species, and endangered, threatened and protected (ETP) species.

Workshop recommendation

Look to promote selective gears or banning of damaging fishing methods. National measures should establish spatial management (no fishing) zones (protected areas and spawning grounds). Information on vulnerable species needs to be strengthened as part of the commitment to better data collection. Protected species require transboundary cooperation e.g. implementation of regional plans of action (RPOA) for protected species. All ecosystem considerations must include climate change.

Governance

From the top down, there is a need for a higher level educational commitment focusing on politicians and civil society. Communication of science for decision-making is a critical aspect of this. From the bottom-up a strong co-management process will give a much more effective FMP and is likely to ensure greater buy-in by fishers. In some cases the FMP is encouraged by economic/trade considerations and marketing issues being incorporated into management decision-making.

Workshop recommendations

Improve management participation through local authorities and co-management. Seek the establishment of fishery specific management councils, which are representative of the fishery stakeholders and include scientists, fishery managers, private sector, and NGOs as principal advisory bodies for the development of the FMP.

It will probably be necessary to make appropriate changes to the regulatory system to improve effectiveness.

Central and provincial governments need to prioritize their commitment to funding management plans. The identification of sustainable financing mechanisms and the communication and promotion of the costs and benefits of the management plans will support this.

It is very important that an FMP should have a monitoring and evaluation (M&E) component.

PROMOTING RESPONSIBLE, SUSTAINABLE AQUACULTURE DEVELOPMENT

The initial focus of national planners in many countries of the region was primarily aquaculture development to increase production, earn foreign exchange, create employment and generate livelihoods. Aquaculture development was often not well regulated in the initial stage and principally was traditional in nature and small-scale. This made planning and management difficult and sustainability was not a priority when the sector was being developed.

Many countries did not have the regulatory and policy framework for mandating the use of assessment tools and regulatory frameworks could not keep pace with the speed of technology and trade development in aquaculture in Asia. It was only when countries were faced with problems associated with aquaculture development (e.g. poor environmental quality, disease, food contamination, social inequality), that they started to look into assessment tools and regulatory frameworks. There is now an increasing movement from production focused planning towards more responsible aquaculture development with a focus on sustainable production systems. The implementation of assessment tools requires expertise, financial resources, and a legal framework which are often lacking in many countries of the region. It is only in the last decade that countries have developed national aquaculture strategies. These strategies increasingly allow and require the use of assessment tools.

There are many drivers for the use of assessment tools in aquaculture:

- market forces and trade requirements;
- food safety issues;

- feed safety issues;
- the need to comply with national requirements and regulatory frameworks;
- the need to comply with international agreements and requirements;
- long-term sustainability of the sector;
- responding to the concerns of NGOs, consumers and the general public; and
- responding to emerging issues like climate change, disease emergence, etc.

Assessment tools can be used to address aquaculture development/planning issues such as:

- environment (e.g. environmental impact assessment);
- aquatic animal health (e.g. surveillance);
- international trade (e.g. import risk assessment);
- Biodiversity (e.g. genetic risk analysis);
- invasive alien species (e.g. ecological risk analysis);
- food safety (e.g. residue testing, traceability);
- aquaculture development (e.g. spatial planning);
- carrying capacity (e.g. zoning);
- production process (e.g. public and private certification);
- greenhouse gas emissions (e.g. life cycle analysis);
- input quality (feed, seed, medicines) (e.g. quality assessment); and
- social and economic issues (e.g. social impact assessment, value chain analysis).

Workshop recommendations

Initiate a regional process to evaluate the use of various aquaculture assessment tools now being used in the region.

Evaluate the usefulness or effectiveness of existing tools for aquaculture development and suggest possible modifications for applicability in the region.

Review the adoption rates of various assessment tools by different countries.

Develop generic guidelines (e.g. for marine spatial planning) for use by countries in the region in order to encourage implementation of assessment tools.

Conduct a cost-benefit analysis of the use of assessment tools and develop mechanisms for sharing benefits through the supply chain from producers to consumers.

International and regional organizations consider developing a regional programme to support implementation of aquaculture assessment tools in the Asia-Pacific region, within a broader regional approach to ecosystems training programmes.

Support the development/revision of national aquaculture strategies so that the assessment tools are included in the national planning/development programmes of countries.

BACKGROUND TO THE WORKSHOP

The Asia-Pacific Fishery Commission (APFIC) is an intergovernmental regional fisheries advisory and consultative body that aims to increase understanding, awareness and cooperation with respect to fisheries issues in the Asia-Pacific region. There are 20 member countries, principally from the Asian region.

The 31st Session of APFIC encouraged members to undertake assessments where possible to assist fishery and aquaculture management decision-making. APFIC further emphasized the need for lower cost fishery assessment methods that are not heavily reliant on survey cruises and for developing assessment techniques for data-poor, small-scale fisheries based on qualitative data and risk-based approaches. The need for improved management of aquaculture at farm and sector level has also been identified. As part of APFIC's Regional Consultative Forum Approach to support dialogue and improve understanding of key fisheries issues of common interest to the Asian region, the 31st Session of APFIC identified a priority work programme: *Strengthening assessment of fisheries and aquaculture in the Asia-Pacific region for policy development*.

The regional consultative workshop brought together 58 participants from member countries and competent regional organization partners to discuss, hold consultations on, and influence the region's efforts on developing and applying various types of fishery and aquaculture related assessments to support the management process. In the context of capture fisheries, the focus was on reviewing how existing assessment approaches can contribute to the different phases of the management process. The focus in aquaculture was to help develop standards for environmental impact assessments (EIAs) and footprint type activities to support ecosystem approaches to management.

The workshop reviewed specific fishery and aquaculture assessment case studies from within the APFIC region focusing on methodologies, the purpose/reason for the assessment, and how the information from the assessment was used to inform or support improved management. It also reviewed some of the tools that have been used for stock assessment and fishery assessments such as EIA, Import Risk Assessment (IRA), and asked how they can be tailored to the characteristics of fisheries/aquaculture within the region (especially small-scale fisheries).

The workshop initiated a network/community of practice for the region that will facilitate the sharing of learning experiences and contribute to the increased use of assessment tools. It developed a priority list of recommendations on how the use of assessment tools can be appropriately applied in data-poor situations and small-scale fishery/aquaculture situations that are characteristic of the region and identified the capacity building needs to support this.

PARTICIPANTS

The 58 participants/delegates were involved in fisheries management/fisheries research and related policy development, implementation of projects/programmes/certification initiatives connected to fisheries/aquaculture assessment. They comprised:

- country participants from the APFIC member countries who presented national case studies;
- resource persons and representatives of regional organizations and projects competent in fisheries and/or aquaculture or the marine environment (Southeast Asian Fisheries Development Center (SEAFDEC), Network of Aquaculture Centres in Asia-Pacific (NACA), Bay of Bengal Large Marine Ecosystem (BOBLME), Regional Fisheries Livelihoods Programme (RFLP);
- regional representatives of international NGOs competent in fisheries (World Wide Fund for Nature (WWF) programmes);
- selected private sector industry organization/federation representatives (International Fishmeal and Fish Oil (producers) Organization (IFFO), Sustainable Fisheries Partnership (SFP), Abba Seafood AB); and
- FAO and regional resource persons.

OPENING CEREMONY

H.E. Tin Naing Thein, Union Minister, Ministry of Livestock and Fisheries and Ministry of National Planning and Economic Development, Myanmar welcomed the participants and thanked APFIC for its support in convening the workshop. He noted the importance of assessment tools for the sustainable management of fisheries resources and the challenges facing fisheries and aquaculture development in Myanmar. He concluded by wishing the participants a successful workshop and an enjoyable stay in Myanmar.

Mr Simon Funge-Smith, FAO RAP Senior Fishery Officer and APFIC Secretary, thanked the Government of Myanmar and welcomed participants to the workshop. He noted that there is a need for human resource development to improve fisheries assessment, and the development of innovative approaches to improve the management of the fisheries and aquaculture in the region. Qualitative data collection techniques and risk assessment approaches as recommended by the 31st Session of APFIC could be used. He noted that improving the assessment of fisheries and aquaculture and promoting greater understanding of the application of tools for strengthening fisheries and aquaculture management in the region was a priority. In closing he thanked everyone for their participation and stated that he looked forward to their contributions.

The workshop was declared opened.

INTRODUCTION TO THE WORKSHOP AND ITS OBJECTIVES

Mr Simon Funge-Smith introduced the workshop and its objectives to the participants. He commented that the workshop would review case studies of fisheries assessments in the APFIC region, looking at methodologies, the reasons for the assessments and how the assessments informed and/or supported improved management. Through case study presentations, the workshop would also review the tools that have been used, such as stock and fishery assessments, fishery improvement planning, EIA, IRA. These cases studies would explain how they fitted characteristics of fisheries/aquaculture in the region. Finally, the workshop will provide a review of the interest in and/or need for a regional/subregional assessment network or community of practice (to facilitate sharing experiences, contribute to increased use of assessment tools) and develop recommendations on how the use of assessment tools can be applied in the region, how to encourage their broader application, and the capacity building needs to provide support to this.

The APFIC Secretary explained that the process of the workshop is based on a regional review of how assessments can support fishery improvement planning, examples of different assessments from the region, country presentations on national case examples and working group discussions to share understanding and develop recommendations.

The Secretary commented that the recommendations of the workshop would be deliberated at the 32nd APFIC Session that will be convened in 2012 in Viet Nam.

The agenda of the workshop was then adopted by the workshop participants and is presented in Annex I.

CASE STUDIES OF FISHERY AND AQUACULTURE ASSESSMENTS

TRANSITION TO BEST FISHERIES MANAGEMENT PRACTICE: COMBINED ASSESSMENT & FISHERIES IMPROVEMENT METHODOLOGY

Richard Banks and Graeme Macfadyen, Poseidon ARM Ltd.

The presenters reviewed the problems that fisheries face (e.g. depleted marine capture fisheries and low catch rates, excess fishing capacity and dissipated resource rents, limited management of ecosystems degradation, weak information collection and analysis systems, IUU fishing and weaknesses in law enforcement and in controlling fishing intensity, misalignment of political and management objectives, misalignment of funding priorities, and difficulties in successful decentralization). They stated that international commitments require further improvements and noted that governments have a moral obligation to improve the livelihoods of those they represent.

There are now many international frameworks and commitments to guide improved fisheries management and the presenters mentioned a number of drivers of change. They noted that the Marine Stewardship Council (MSC) performance indicators (PIs) are increasingly being used to benchmark fisheries. These can be used as a precursor to certification, or just as a tool to identify necessary improvements to be incorporated into a Fishery Improvement Planning Process (FIPP) (or Fishery Improvement Plan (FIP) project). The presenters expressed that concerns over the applicability of FIPP to multi-species fisheries in developing countries is sometimes misplaced and that it was possible to address complex fisheries using this approach. There are a number of FIPPs underway, or are in the planning stage in many countries in the region, supported by various donors and NGOs such as WWF and SFP.

The presentation provided detailed information on the six steps involved in **FIPP**, and the principles associated with them:

Step 1	Rapid assessment of fishery (fleet type, stock, gear, bycatch interactions and governance issues) by assessor against Scoring Guideposts (SGs) for all PIs
Step 2	Identification by assessor of necessary actions based on weaknesses and best practice
Step 3	Workshop process to discuss, amend, and agree actions as part of a documented FIP, which is time bound and includes assigned responsibilities
Step 4	Preparation of a fishery management plan (FMP) based on the FIP
Step 5	Project planning for implementation
Step 6	Project implementation

In Table 1 below there is an example from Indonesia (tuna) for Step 1 targeting stock status (Principle 1) of how colour coding can be used to identify quickly the key strengths and weaknesses of the fishery (and different units of assessment), as measured against best practice for each of the PIs.

Each column represents one of the PIs, and the rows represent different fisheries or units of assessment (i.e. different vessel types or gears). Green shows that the fishery meets the acceptable SG, orange that it is just below the SG, and red that the fishery is a long-way from meeting the SG.

Table 1. Example of rapid assessment of stock status for Step 1

	MSC Performance Indicators	Fishing method					
		Purse seine <30 GT	Purse seine >30 GT	Pole & Line	Long line	Troll	Hand-line
Pacific Skipjack tuna	1.1.1. Stock status	🟢	🟢	🟢		🟢	
	1.1.2. Reference points	🟢	🟢	🟢		🟢	
	1.2.1. Harvest strategy	🔴	🔴	🔴		🔴	
	1.2.2. Harvest control rules and tools	🔴	🔴	🔴		🔴	
	1.2.3. Information and monitoring	🟡	🟡	🟡		🟡	
	1.2.4. Assessment	🟢	🟢	🟢		🟢	
Pacific Yellowfin tuna	1.1.1. Stock status	🟢	🟢	🟢	🟢	🟢	🟢
	1.1.2. Reference points	🟡	🟡	🟡	🟡	🟡	🟡
	1.2.1. Harvest strategy	🔴	🔴	🔴	🔴	🔴	🔴
	1.2.2. Harvest control rules and tools	🔴	🔴	🔴	🔴	🔴	🔴
	1.2.3. Information and monitoring	🟡	🟡	🟡	🟡	🟡	🟡
	1.2.4. Assessment	🟢	🟢	🟢	🟢	🟢	🟢
Pacific Bigeye tuna	1.1.1. Stock status	🔴	🔴	🔴	🔴	🔴	
	1.1.2. Reference points	🔴	🔴	🔴	🔴	🔴	
	1.2.1. Harvest strategy	🔴	🔴	🔴	🔴	🔴	
	1.2.2. Harvest control rules and tools	🔴	🔴	🔴	🔴	🔴	
	1.2.3. Information and monitoring	🟡	🟡	🟡	🟡	🟡	
	1.2.4. Assessment	🟢	🟢	🟢	🟢	🟢	
Indian Ocean Skipjack tuna	1.1.1. Stock status	🟡	🟡			🟡	
	1.1.2. Reference points	🟡	🟡			🟡	
	1.2.1. Harvest strategy	🔴	🔴			🔴	
	1.2.2. Harvest control rules and tools	🔴	🔴			🔴	
	1.2.3. Information and monitoring	🟡	🟡			🟡	
	1.2.4. Assessment	🔴	🔴			🔴	
Indian Ocean Yellowfin tuna	1.1.1. Stock status	🟡	🟡		🟡	🟡	🟡
	1.1.2. Reference points	🟡	🟡		🟡	🟡	🟡
	1.2.1. Harvest strategy	🔴	🔴		🔴	🔴	🔴
	1.2.2. Harvest control rules and tools	🔴	🔴		🔴	🔴	🔴
	1.2.3. Information and monitoring	🟡	🟡		🟡	🟡	🟡
	1.2.4. Assessment	🟡	🟡		🟡	🟡	🟡
Indian Ocean Bigeye tuna	1.1.1. Stock status	🟡	🟡		🟡	🟡	
	1.1.2. Reference points	🟡	🟡		🟡	🟡	
	1.2.1. Harvest strategy	🔴	🔴		🔴	🔴	
	1.2.2. Harvest control rules and tools	🔴	🔴		🔴	🔴	
	1.2.3. Information and monitoring	🟡	🟡		🟡	🟡	
	1.2.4. Assessment	🟡	🟡		🟡	🟡	

Key: 🟢 Meets Scoring Guidepost
🟡 Below Scoring Guidepost
🔴 Fail

The presentation also provided some working examples of how fisheries in the region (such as Indonesian tuna fisheries, Indian shrimp trawl fisheries, Vietnamese blue swimming crab tangle net fisheries) have been assessed against the range of PIs available.

The presenters concluded by *highlighting that the FIP process can be very useful for fisheries managers,* but there are a number of barriers to implementation of FIPs, and suggesting that the workshop might like to consider these barriers in more detail, how to remove them, and how the implementation of FIPs might be further supported in the region.

RAPID ASSESSMENT OF FISHERIES FOR MANAGEMENT PLANNING PURPOSES – CASE STUDIES FROM ZAMBOANGA DEL NORTE, PHILIPPINES

Duncan Leadbitter and Richard Banks, Poseidon ARM Ltd.

The rapid assessment of fisheries was an initiative of the Spanish government funded, FAO implemented, Regional Fishery Livelihoods Programme (RFLP) (GCP/RAS/237/SPA) as part of its broad range of activities to enhance fisheries and resource management in South and Southeast Asia. The presentation highlighted that ecosystems-based approaches to fisheries management are increasingly being implemented in the region, but can be costly and time-consuming. As a result, a range of rapid assessment and cost effective tools are increasingly being used to help improve fisheries management. The presentation re-emphasized that the *MSC Fisheries Assessment Methodology (highlighted in the previous presentation) is a useful tool for assessing fisheries management improvement and indeed for helping it improve.*

The case studies:

- showed how an assessment that was completed for the sardine fisheries in Zaboanga del Norte in the Philippines (with funding from the regional RFLP) used the Scoring Guidepost system for individual Performance Indicators (PIs);
- noted that the MSC risk-based fisheries assessment tools (Productivity Susceptibility Analysis, and Scale, Intensity, and Consequence Analysis) can be useful, especially in data-poor fisheries – in most cases, a specific numeric score is not provided for each PI, but colour coding (red, orange, green) is used to provide an indicative PI score, with red and orange highlighting where specific action might be most required; and
- highlighted *the importance of ensuring stakeholder participation in the process,* and the need to develop a clear implementation plan.

During the discussion that followed, it was agreed that it is very necessary to *separate certification from fisheries planning.* In some cases, rapid (pre-) assessment for certification uses these tools, but the rapid assessment can also be used to start the FIPP. The rapid assessment tools can therefore be used to apply an Ecosystem Approach to Fisheries (EAF).

It was agreed also that where there are co-management mechanisms already in place, it is easier to act in this direction, finding the areas of entry, and the areas that need greater attention. Finally, a participant commented that in the ecosystem component "environmental changes" (e.g. driven by climate change), it will be important to monitor how the management system responds to those changes.

BUILDING INTEGRATED ASSESSMENT MODELS INCORPORATING MULTIPLE SOURCES OF INFORMATION: WHERE WE ARE WITH HILSA (TENUALOSA ILISHA) AND WHERE TO GO FROM HERE?

Rishi Sharma, BOBLME, Dr Anis Rahman, BFRI, Chandpur Bangladesh and Dr Suresh, CIFRI, Kolkata, India

This presentation synthesized some of the outputs of the Bay of Bengal Large Marine Ecosystem (BOBLME) workshops and work on Hilsa shad fisheries in the Bay of Bengal. The species is found in the whole of the Bay of Bengal but is concentrated in its northern parts. Indications from genetic work

suggest that there is one stock, but that there are perhaps sub-stocks in the region. Spawning and juvenile stages of the life cycle take place in fresh and brackish water, with the adult stage of the lifecycle in marine waters. Current assessment approaches using length-based methods show that freshwater catches have been constant in recent years and that the marine catches have been increasing. Management strategies in Bangladesh now focus on a ban on juvenile catches from November to May, the use of juvenile fish sanctuaries, and a short closed season of ten days when spawning takes place. Monitoring data show that the catch rates of juvenile fish have significantly improved since 2005 and that total production has increased. *In India, fleet size has been increasing and there are few effective management methods (except for some mesh size limitations). There are also indications of excess fishing capacity and increasing overfishing.*

In Myanmar, data availability is weaker with no available assessment to determine whether catches are sustainable or not, but previous fleet over-capacity has to some extent been addressed by the government. In summary, there is significant recruitment failure and habitat loss, recruitment overfishing, and excess fleet capacity. A comprehensive assessment model has been developed (a biomass dynamic model) using age-based or length-based data from different data sources. The presentation noted the limitations of some of the input data for the model, and the uncertainty of the resulting outputs for parameter values in terms of B_{MSY}, growth rates, and percentage of the stock depleted. Trends in such values are certainly down, although the model shows that *effort controls would lead to improvements (as seems to have been the case in Bangladesh).* Standardized stratified data collection in the region was suggested as being of special importance.

MIXED-SPECIES FISHERIES

Abu Talib bin Ahmad, SEAFDEC-MFRDMD

The fisheries of the western coast of peninsular Malaysia account for about 50 percent of national fisheries production. There are many gears in operation such as trawls, purse seines, drift/gill nets, and hook and line. The fisheries are also very multi-species in composition, with more than 200 species captured. Catch per unit effort (CPUE) of demersal fish has shown a continuous declining trend over the last ten years. But the detailed data required for really effective assessment are generally lacking.

Recent work in Malaysia has used a Productivity Susceptibility Analysis (PSA), examining for each species seven attributes of productivity and four of susceptibility to estimate the risk level for the species under examination. Distribution of risk was estimated for 129 species in the trawl fishery and generally shows medium to high risk scores, with *40 percent of all species being at high risk.* Management measures for these specific stocks are thus especially needed. The *PSA has successfully provided information to determine whether existing management measures are appropriate.* It also shows where data collection needs to be focused (on the high risk species). The presentation noted that there is currently a licensing scheme by zone in the west coast of the peninsula, and it would be useful to do more zone-specific PSA. Additional PSA for purse seine fisheries (30 species), trap fisheries (14 species) and drift/gill net fisheries (60 species) showed much lower risk scores (low to medium).

In conclusion, it was noted that *even for PSA some necessary data are not available.* It was therefore recommended to *apply species composition and percentage contribution to total catch data to obtain estimates of landings by species,* to use the biological information contained in FishBase, and to use proxies in cases with missing data.

THE IFFO IMPROVERS PROGRAMME: A MEANS TO ENCOURAGE AND DEMONSTRATE COMMITMENT TO THE RESPONSIBLE PRODUCTION OF FISHMEAL AND AQUACULTURE

Andrew Jackson, International Fishmeal and Fish Oil Organization

IFFO is a trade organization representing fishmeal and fish oil producers, and its members account for about 80 percent of the world trade in fishmeal and fish oil. Despite the growth in aquaculture in recent years, the production of fishmeal and fish oil is not increasing. Sixty percent of global production of fishmeal goes to aquaculture, and the rest to poultry, pigs and other industries. The figure for fish oil is even higher at 81 percent. About 22 million tonnes of inputs (and 17 million tonnes of whole fish) to the process generate around 5 million tonnes of fishmeal and 1 million tonne of fish oil. Major issues for the industry now are the need:

- *to prove there is no IUU fish going into meal;* and
- to *ensure/assure the purity and safety of the product*.

As a result, IFFO have developed a Global Standard for Responsible Supply (GSRS). This is a business-to-business initiative, developed through consultation with many stakeholders such as standards experts, fish farmers and NGOs. The GSRS standard is going through ISO-65 accreditation, and the scheme is a third-party certification scheme of fishmeal/oil factories. To comply with the standard, factories must show, amongst other things, that they sourced from CCRF-based fisheries, are not including IUU products or any products on IUCN red lists, and have a manufacturing process under a recognized quality assurance scheme. The assessment is a similar to an MSC pre-assessment. There are now 75 approved factories under the GSRS, since the first one was approved in 2009. *This represents 25 percent of world production of fishmeal and oil*. There is also a chain of custody scheme.

There is recognition by the IFFO that it will be difficult for many factories, particularly in Asia, to comply with the GSRS. So IFFO are in the process of developing an Improvers Programme. IFFO are working with the SFP so that Fishery Improvement Plans (FIPs) and Factory Improvement Plans will form an IFFO Action Plan, which will include auditable milestones. This will be a *way for buyers of final aquaculture products to have some assurances that suppliers/producers of aquaculture are making efforts to improve the fishmeal and oil* they use. IFFO and SFP will be holding a meeting in Bangkok at the end of November, after which they hope to launch the programme officially.

THE GOOD FISH CODE – BETTER FISHERIES THROUGH CO-MANAGEMENT

Duncan Leadbitter, Fish Matter Pty Ltd.

The rationale for this project (funded under the FAO Spanish Funded Regional Fishery Livelihoods Programme, RFLP), came from the fact that poor fisher communities are often those that are impacted most by bad fisheries management. In addition, incentive schemes that are used widely as a mechanism for stimulating community and private sector action may not be applied to fisher communities, which lenders often perceive to be disorganized and high risk borrowers. Therefore accessibility to lending in the fishery sector is constrained and this restricts the finance available for investment in the sector. Project-linked funding for improvements may not be sustained in the long-term. Thus there are limited opportunities for poor fishing communities to escape from the poverty trap, even if they are trying to improve their management and use of fishery resources. *There is a need for a way to identify and reward resilient communities that are working to improve their management of fisheries and strengthen their organization.*

The presentation described the development of the Good Fish Code, which is based on the CCRF and focuses on small-scale fisheries, but is *not a certification scheme*. The main aim is to encourage co-management and through this, increase accessibility to microfinance and/or preferential access to markets. *The Good Fish Code is not intended to support marketing–related sustainability claims.* The use

of verification, rather than auditing, means that verification can be carried out at lower cost as verifiers do not need to be accredited as certifiers, and locally-based organizations or experts can get involved with verification. It also means that verifiers can offer advice (unlike under third-party certification schemes such as the MSC). There are five steps involved in complying with the Code:

1. establishing a governance regime;
2. completing a fishery assessment;
3. putting in place an audited improvement plan;
4. completing an input audit; and
5. completing an outcome audit.

The Code contains Principles and Criteria, and a series of testable statements, which are colour coded (similar to the FIPs presented earlier). The principles relate to Resources (three criteria), Management (four criteria), Participation (four criteria), Safety (four criteria), Resilience (three criteria), Community Development and Environmental Conservation (three criteria), and Information Exchange and Management (three criteria). Consultation within the six Regional Fisheries Livelihoods Programme (RFLP) countries has produced a list of possible incentives for fishing communities that are involved with the Code. The idea is that as fishers move through the five steps above, the incentives become greater and more financial in nature and that these are specific to particular fisheries areas or countries.

SUSTAINABLE SOURCING – A PRIVATE SECTOR PERSPECTIVE

Maria Åberg, Abba Seafood AB

This presentation from Abba Seafood focused on a project developed by stakeholders in the value-chain for Thailand's canned longtail tuna (*tonggol*). Abba's commitment to responsible sourcing involves a yearly evaluation of all species they sell. *Sustainable sourcing for Abba is becoming necessary because of NGO advocacy linked to increasing consumer concerns.* It is also important, since Abba considers it makes good business sense to ensure long-term sustainability of supplies and to *demonstrate the company's commitment to corporate social responsibility (CSR).* Abba *tonggol* tuna is a premium brand in Sweden, and Abba has been buying it for 30 years from Thai packers. But *tonggol* tuna is included in the Monterey Bay Aquarium Seafood Watch list for 2010 as a species to avoid. And the lack of information and management for the fishery encouraged Abba to start discussing with canneries, NGOs, and SIDA in 2008 to get funding for a project to contribute to sustainability. Abba feels that there are opportunities and benefits for all in the value-chain to be involved in the project.

LESSONS LEARNED FROM FAO'S WORK IN FISHERY-RELATED ASSESSMENTS

Gabriella Bianchi & Petri Suuronen, FAO Fisheries and Aquaculture Department

Assessment needs have changed over the decades with the changing structure of the fishing industry and a growing awareness of other drivers affecting stock status. Traditional stock assessment (using both fishery-dependent and fishery-independent data) describes the past and current status of the fish stock, and ideally provides the necessary information for fisheries managers to manage fish stocks, typically based on maximum sustainable yield.

FAO's involvement with assessment started in the 1950s and helped to develop assessment methods for tropical multi-species models. Some key lessons learned are that some effective management must be in place for stock assessment to be useful, one type of assessment does not fit all situations, and assessment requires a major investment and so before carrying it out one has to consider the scale and importance of the fishery. The move to an Ecosystem Approach to Fisheries (EAF) management has taken place because previous management practices weren't that successful and there has been wide degradation of resources and the environment. In addition, there is increasing recognition of society's involvement in, and impacts on, ecosystems.

The information requirements for EAF are much broader than traditional assessment methods, and the process has to be more participatory. Relevant types of assessment are more integrated and allow managers to monitor progress in relation to social and economic objectives as well as resource objectives. A key issue is the need to expand management objectives in terms of time scales. Experience shows that fisheries surveys have become increasingly widespread, with methodologies developing very quickly.

The presentation concluded that *fisheries systems are typically complex, and that science is a necessary but not sufficient condition for successful resource management, particularly if management systems are not strong.* Thus more science does not necessarily mean better management. A second key lesson is that fisheries must be viewed in a holistic way if effective management decisions are to be made.

MARKET DEMAND FOR MSC CERTIFICATION: INCENTIVIZING FISHERY IMPROVEMENT PROJECTS

Jesse Marsh, WWF-US Fisheries Program

WWF considers the Marine Stewardship Council (MSC), with its three principles focusing on stocks, ecosystems and management, as the gold standard in eco-labelling. WWF supports the use of the MSC framework in its fisheries improvement work. WWF works with retail and food service companies (including Walmart and other large retail and food service companies) to support improvements in fisheries management. *Many large companies in the United States have shifted their commitments from sourcing just from MSC-certified products to sourcing from certified fisheries or those in fisheries improvement programmes.* This means that companies can contribute towards fisheries improvements, rather than just switching supplies. WWF fishery improvement projects involve a stepwise approach (as outlined in the first presentation), partnering with local stakeholders, and the use of technical support from consultants/ assessors. The use of a pre-assessment using the MSC-framework is considered very important in identifying issues that need to be addressed in the Fisheries Improvement Plan (FIP). The stakeholder meeting is also especially important and implementation progress is tracked quarterly and involves annual FIP review meetings. There are many FIPs around the world that are ongoing, in development, or in a scoping stage. One example of an FIP in the region is the blue swimming crab fishery in Viet Nam. There are other *examples of FIPs outside the region that are well advanced and that have made measurable improvements in management performance,* notably the Bahamas spiny lobster fishery and the *mahi mahi* fishery in Ecuador. Key factors for success include managing expectations, good stakeholder engagement and commitment, on-the-ground support (through an FIP coordinator), the use of technical advice and inputs as needed, appropriate financial and human resources, and review and monitoring of FIP progress and specific outputs.

SEAFDEC PELAGIC PROGRAMME

Worawit Wanchana, Capture Fisheries Technology Division, SEAFDEC Training Department

Most of SEAFDEC's activities in its pelagic programme are implemented through the ASEAN-SEAFDEC Strategic Partnership Mechanism. The two main types of activity are information sharing in the region (e.g. through technical meetings, maintenance of databases on fisheries statistics, and proposed publication of a document on the status and trends of fisheries in Southeast Asia) and information collection (e.g. through resource surveys, tagging, and the use of "black boxes" on commercial fishing vessels). The programme has resulted in: increased information on abundance, growth, mortality, reproductive data, catches, and distribution of important pelagic species (e.g. mackerel, scad, sardine, and coastal tuna); an overview of pelagic fisheries in seven ASEAN countries; identification of fishing grounds (current and potential); and information on stock densities. *A key recommendation is to evaluate the impact of the findings of the programme.*

FISHERY IMPROVEMENT PLAN FOR SMALL-SCALE TUNA HANDLINE FISHERIES IN THE PHILIPPINES

Jose A. Ingles, WWF Coral Triangle Network Initiative

The Partnership Programme Towards Sustainable Tuna (PPTST) is a four-year FIP project (2011–2014), working in two project sites (Mindoro and the Lagonoy Gulf) in small-scale yellowfin handline fisheries (about 5 000 vessels in total at the two sites). The main export product is fresh chilled tuna loins to Europe. The project follows a scoping exercise of potential candidate fishery sites. The key approaches used in the FIP are creating awareness, communication and community organization, data gathering on the fishery and the supply chain, and creating an enabling environment. *The key strategies are to use and support a co-management system, market-based incentives, value-chain promotion, and replicability based on the lessons learned*. The project intends to make measurable improvements in management performance (e.g. increased licensing, introduction of a catch documentation scheme and rights-based management, specification of a management plan and special fishery management areas based on a co-management approach), landing site improvements, safety, and an ultimate objective is MSC-certification. On the market-side the project will introduce traceability into the supply chain, improved food-safety measures, and value-chain promotion (e.g. through better killing, handling and grading). Some challenges experienced so far are to generate the necessary involvement, the existing human capacity, and the time required to bring about change.

ASSESSMENT TOOLS IN AQUACULTURE: IMPORT RISK ASSESSMENT

C.V. Mohan, Network of Aquaculture Centres in Asia-Pacific (NACA)

The emergence and spread of aquatic animal diseases (largely a result of intensive practices and trade in live aquatic animals) has been a key driver in the need for, and use of, Import Risk Assessment (IRA). *The WTO SPS Agreement has provided the basis for countries to reduce the risks of transboundary aquatic animal diseases (TAAD) from trade, but any trade measures must be justified.* Risk analysis is based on both the likelihood and consequence of undesirable events, or hazards. Risk assessment generally involves release assessment, exposure assessment, consequence assessment, and risk estimation, and is often largely qualitative in nature because of the costs involved in trying to do quantitative risk assessment. There are technical guidelines for IRA that have been prepared by NACA/FAO, as well as many published resources on risk analysis (guidelines, manuals, case studies), and there have been various measures on capacity development in the region to support improved aquatic health and application of IRA. Risk analysis is now also being used as a tool to assess and improve farm level biosecurity and manage climate change. *IRA was not generally used during the first introductions of P. vannamei* (Sri Lanka is the exception) but some countries such as Thailand have *conducted IRA post-introduction to identify risks and mitigation strategies and successfully inform policy decisions.* IRA has also been used in Fiji and the Cook Islands, and in Viet Nam to help with decision-making. *There has been limited success with promoting responsible transboundary movement of live aquatic animals and therefore the implementation of risk analysis recommendations remains the key* to controlling the spread of aquatic diseases.

TRAWL FISHERIES BYCATCH MANAGEMENT PROJECT: OBJECTIVES, CHALLENGES AND OUTCOMES

Petri Suuronen, FAO Fishery Department

Managing tropical trawl fisheries is complex and the efficient use of trawl products means that there are few discards. However, there are issues associated with poorly managed tropical trawl fisheries, e.g. juvenile fish and non-targeted species may be at risk from trawling. The FAO/Global Environment Facility (GEF) project *Strategies for Trawl Fishery Management* aims to explore strategies for ensuring that the benefits are enhanced and the risks are reduced.

FAO is the GEF agency for the project, which will be executed by five countries (Indonesia, Papua New Guinea, Philippines, Thailand and Viet Nam) in partnership with SEAFDEC with a total budget of

USD11.2 million. Other project partners taking part are the Center for International Migration and Development (CIM), the Swedish International Development Agency (SIDA), WWF, SPF, IFFO, RFLP and the private fishing sector in the participating countries. The project will start in 2012 and will end in 2015. The project will work directly with fishers (small-scale and large-scale) and the fishing industry (processors, retailers) together with other stakeholders and partners.

The project will assist and facilitate a change and seek a regional consensus in trawl fisheries management and legislation. It will also identify and increase understanding of critical barriers for executing responsible fishing by the private sector. The project will engage the private sector to participate in developing and adopting best practices and the creation of adequate incentives in order to promote responsibly supplied products (fishmeal, surimi etc.) from tropical trawl fisheries.

Bottom trawling for fish and shrimp in high-biodiversity ecosystems produces large quantities of low value fish (so-called trash fish) which include juvenile fish of species targeted by other means. There is growing concern that the trash fish catch is reducing the quantity and quality of fish resources and thus threatening the sustainability of fisheries. This in turn affects livelihoods and opportunities and decreases food security.

However, not all trash fish or low value fish catches are bad. Low value/trash fish has become important for livelihoods as other species have declined. Aquaculture development is a strong economic driver (high demand for feed) and the development of new products has also created demand (e.g. surimi). The *project challenge is how to focus measures so that the catch of the most problematic species is reduced and done so in a manner that encourages buy-in by the fishery operators.* The project also seeks ways to *create effective incentives for fishers to reduce non-sustainable trash fish.* At the same time, it is clear that there is a need to reduce overcapacity and excess effort in trawl fisheries in the region.

Long-term outcomes of the project are an agreed regional tropical trawl management policy and plans and cost-effective measures and practices adopted to reduce catches of juvenile fish and other species at risk. One goal is the development of appropriate harvest strategies (including trawl impact indicators and reference points) for available catch of species of concern reduced by 20 percent. It is expected that incentives for trawl operators will be defined and implemented. One indirect outcome would be improved data on catch composition and on the condition of sensitive fishing grounds. This could be collected through standardized methods across all project countries.

COUNTRY EXAMPLES OF FISHERIES ASSESSMENTS

POPULATION PARAMETERS AND DYNAMIC POOL MODELS OF COMMERCIAL FISHES IN THE BEIBU GULF, NORTHERN PART OF THE SOUTH CHINA SEA: A CASE STUDY OF STOCK ASSESSMENT BASED ON LENGTH FREQUENCY DATA

Qiu Yongsong, China

The presenter focused on a case study on the northern part of the South China Sea. Agreement was reached with Viet Nam to collect data on eight species from stern trawlers in Beibu Gulf (Gulf of Tonkin). Growth parameters, total mortality, natural mortality and stock status were all estimated. A key finding was that fishing mortality could be increased (even above Gulland's recommended E = 0.5 for temperate regions) even though already high, as long as the age at first capture is increased. The conclusion from the study is that the fisheries can sustain high rates of exploitation. The major problem in the fishery is the capture of undersize fishes. *The age at first capture is the real problem in the region, not fishing mortality per se, which leads to management recommendations related to size limits and mesh size regulations, along with closed fishing seasons/areas for juvenile fish.* This supports the findings from Bangladesh on the Hilsa fisheries.

CREATING THE ALEUTIAN ISLANDS FISHERIES ECOSYSTEM PLAN

Diane Evans, National Oceanic and Atmospheric Administration (NOAA), United States

The major fisheries in the area are Pacific cod, atka mackerel, rockfish, pollock, and crab. A key starting question in developing the Fishery Ecosytem Plan (FEP) was how important is it to consider the Aleutian Islands (AI) as a unique eco-region even though it is currently managed in conjunction with the larger Bering Sea, and given that the AI is the least predictable of the Alaska marine ecosystems. Developing the FEP involved a number of steps:

1. **surveying and synthesizing ecosystems information** (historical, physical/oceanographic, biological, socio-economic, management);
2. **identifying interactions** (e.g. circulation patterns and waterflow, acidification, fishing mortality, fish removals, permit systems, etc.);
3. **identifying indicators** (available and ideal);
4. **conducting risk assessment of interactions** (based on consensus-based expert opinion, with the management implications discussed for each interaction);
5. **providing management advice based on risk assessment** (including some overarching outcomes in terms of the FEP and synthesis brochure and a recommendation that the AI should be recognized as a distinct ecological entity requiring separate harvest quotas and assessment of impacts of management actions. The work also resulted in annual tracking of available indicators); and
6. **identifying and prioritizing research needs** (based on the risk assessment and the indicators).

One of the key challenges has been how to change management actions based on the recommendations in the FEP. Others included how to insert ecological considerations at grassroots level, how to develop an ecosystem level optimum yield, and how to make risk assessment more quantitative.

FISH FORECASTING IN MALAYSIA

Abdul Khalil bin Abdul Karim, Department of Fisheries, Malaysia

Underlying issues underpinning the pilot project presented include the effects of climate change in terms of sea surface temperatures, migration patterns, rising operating costs, stability of the marine ecosystem affected, and variations in the food available for fish. The project involves five agencies to develop a satellite/remote sensing forecasting system for the movement and migration of fish by monitoring the distribution of the food source of the fish, i.e. primary and secondary productivity. The project collects information, models and manages data, and then makes it available to fishers. *It is expected that the project will reduce IUU fish catches as well as increase fisher profitability, because it is easier for managers to know where fishers are and for fishers to know where the fish are.* Some constraints on the project have included the complexity of the marine environment, fluctuations in environmental conditions, lack of data availability, and the need for cooperation at all levels.

FISHERIES AND AQUACULTURE IN INDIA

G. Mohana Pai, Ministry of Agriculture, Government of India

This presentation focused on policy priorities and budget allocations in India, having placed Indian production in the context of global production and highlighted how the balance of production in India has shifted from marine fisheries to inland fisheries and aquaculture production. The government is focusing on the issues of depleting marine catches, overfishing, post-harvest losses, expansion of deep sea and distant water vessel activity, low levels of investment, and mariculture. A major *policy goal for marine fisheries is to increase production slightly to three million tonnes*. Strategies specified are to regulate capacity, conservation, sea ranching, fish aggregating devices (FADs) and mariculture, and diversification offshore. For marine aquaculture the goal is to increase production to 160 000 tonnes through increasing the water area under farming, diversification, and development in saline areas. Inland strategies to increase production include stocking in reservoirs, pen and cage culture, resource-specific harvesting techniques, and implementation of the FAO Code of Conduct for Responsible Fisheries (CCRF). A sizeable budget is used to support fishers.

STOCK ASSESSMENT OF MARINE FISH RESOURCES IN THAILAND

Praulai Nootmorn and Amnuay Kongprom, Department of Fisheries, Thailand

This presentation highlighted how the status of fisheries and catch rates have decreased since trawl fisheries were introduced in 1996. Stock assessment is difficult in Thailand because of the multi-species and multigear nature of the fisheries, so Thailand uses holistic (Schaefer and Fox) models with catch and CPUE data, as well as analytical modelling to estimate growth parameters, total mortality, natural mortality, cohort analysis, and prediction using length-based Thompson and Bell analysis. *Assessments show that almost all pelagic resources are overfished, many by more than 30 percent. The picture for demersal fisheries is even worse.* Research scientists make recommendations to politicians, *but commercial fisher's lobbies are very strong and this often prevents scientists' recommendations being acted upon by the government.* Other problems include the fact that the data being used for stock assessment modelling is not up-to-date. There is now a Master Plan for Marine Fisheries (2009 to 2018), which includes *updating a fishing vessel record and inventory,* and providing data and information to fishermen at the village level.

MONITORING *DAI* FISHERIES IN CAMBODIA

Chheng Phen, Cambodia

This presentation focused on a bag net (*dai*) fishery of 63 nets in Tonle Sap River, which operates from October to March each year, targeting small species migrating from Tonle Sap during the open season, but also catches some large river species (e.g. Giant barb, *Catlocarpio siamensis* and Mekong giant catfish, *Pangasianodon gigas*). Monitoring involves the collection of biological information and catches, randomly collected. Catches peaked in 2005/6 and have been declining since then, and appear to be correlated with water levels. Inland stock status is not known, *but the data collection programme suggests that there is excess inland fishing effort*. The government has now realised the need to prioritize and focus on aquaculture.

PAKISTAN – FISHERIES ASSESSMENTS

Ghulam Muhammad Mahar, Director General Fisheries, Sindh Province, Pakistan

The presenter provided an overview of the fisheries sector in Pakistan. Management of Fisheries is done at different levels (federal, district and local). The National Fisheries Policy was approved with the support of FAO. The initial results of the fisheries assessment were that there is a reduction of post-harvest losses through upgrading of fishing boat holds and installation of onboard flake ice plants. Fish resources were observed to be lower than in previous surveys (1975–1990). Species diversity indicates disturbed and heavily fished grounds. Larger specimens of some common species such as grouper, croakers, catfishes and ribbonfish were not encountered. Some important species like sharks, rays and guitarfishes were observed to be present, but not in abundance as in previous surveys. A preponderance and diversity of cephalopods, squids and cuttlefish were observed. The *presence of large quantities of threadfin bream and lizardfishes were observed indicating that trawlable grounds have been seriously disturbed resulting in an increase in abundance of opportunistic species.* The Sindh inshore strata contained a few concentrated schools of small pelagics (sardinellas, anchovies and scads). The Balochistan stratum contained comparatively larger schools of small pelagics.

COUNTRY EXAMPLES OF AQUACULTURE ASSESSMENTS

ASSESSMENT OF THE AQUACULTURE DEVELOPMENT PROGRAMME IN VIET NAM, 2000–2010

Nguyen Thi Trang Nhung, Nhu Van Can and Cao Le Quyen, Directorate of Fisheries, Viet Nam

The presenter focused on the evaluation of the aquaculture development programme. Using a wide range of evaluation tools and information sources, e.g. *PRA, statistics, expert consultation,* it found that the programme achieved all of its high level targets for production, exports, areas under farming, and employment targets, but targets for some species were not met, partly because of a lack of realism about some areas identified for expansion. The sector has changed in recent years and has a more industrial scale character, and is successfully providing raw materials for processing and exports. The programme has also *lead to various Prime Minister's Decrees and Decisions.*

RISK ANALYSIS OF IMPORTING WHITE SHRIMP *PENAEUS VANNAMEI* DISEASES INTO THAI WATERS

Kom Silapajarn, DOF, Thailand

Imports of white shrimp to Thailand started in 2002, and now 99 percent of cultured shrimp in Thailand (about 550 000 tonnes per year) comprises white shrimp. *An IRA was conducted in 2004 for 12 pathogens and was used to establish an import regulation and pre- and post-import measures* based on the evaluation matrix of the probability of establishment and significance of consequence (which identified significant risks for some pathogens but not for others). The presentation profiled the many measures taken following completion of the IRA. The lessons learned from the IRA are that all *stakeholders must be involved in the process of risk assessment,* recommended measures can indeed mitigate or prevent impact and risks of disease, but that *even with IRA uncertainty can remain and the IRA has not prevented the introduction of new diseases* (e.g. Taura syndrome virus (TSV)).

ECOSYSTEM APPROACH TO SHRIMP FARMING IN THE NORTH WESTERN PROVINCE OF SRI LANKA

P. Nimal Chandranatne

All shrimp farms in the country are based in the Northwest province and farm *P. monodon*. The common source of supply water (the Dutch Canal) was a major reason for the spread of disease during previous disease outbreaks in the 1990s and early 2000s. The concepts of the crop calendar and zoning were introduced in 2005 and first implemented properly in 2006. The principle is that a timetable is given to farmers for stocking and harvesting so as to reduce the risks of disease based on rainfall and water availability and quality in the Dutch Canal. The crop calendar has been associated with the introduction of Better Management Practices (BMPs) and some regulations to determine allowable stocking rates and support for the establishment of shrimp farming societies. An extensive consultation process was used to design, establish and build community support for the idea of the crop calendar, which works as an ecosystem approach to shrimp farming in the region. *The results of the crop calendar show quantitative reductions in disease outbreaks.* But implementation of the calendar has not been without problems or opposition, and there has not been total compliance with the calendar or BMPs.

MANAGEMENT & POLICY IMPLICATIONS FOR COASTAL AQUACULTURE DEVELOPMENT IN BANGLADESH

Sk Mustafizur Rahman, Department of Fisheries (DOF), Md Enamul Hoq, Bangladesh Fisheries Research Institute (BFRI) and Pradip Kumar Das, Ministry of Fisheries & Livestock (MoFL), Bangladesh

This presentation provided background information on production and fisheries/aquaculture policy. *Stock assessment has informed an action plan for the management of Hilsa, which has increased jatka by 35 percent and Hilsa production by 40 percent.* But on a less positive note, *it is not known whether increasing trends in catches for major marine species in the last five years are because of increased stock abundance or increased fishing effort.* Coastal aquaculture is based on the farming of *P. monodon* not *P. vannamei*, and a key issue is the impact of wild fry collection on ecosystems. The country is very prone to natural disasters, but cyclones and resulting flooding have also been successfully used to support new fish and crab aquaculture in pens.

ENVIRONMENTAL IMPACT ASSESSMENT AND MONITORING IN AQUACULTURE

Nelson A. Lopez, Bureau of Fisheries and Aquatic Resources, Philippines

The presenter provided an overview of the environmental impact assessment process, including information on the institutions involved and the main steps to follow. Projects or programmes, including those concerning aquaculture, are classified as either Category A or Category B. Category A includes new projects which are considered "Environmentally critical projects or projects with significant potential to cause negative environmental impacts". Programmes/projects in this category must prepare either a Programmatic Environmental Impact Statement (PEIS) or an Environmental Impact Statement (EIS). Category B includes existing single projects for expansion and requires an Environmental Performance Report and Management Plan (EPRMP), which is similar to the Initial Environmental Examination (IEE) Report.

Some problems and issues found were lack of clarity about the scope of authority, inconsistencies and conflicts between national government agencies and between local government units. The lack of enforcement remains a continuing concern and the manner of the process's implementation is highly regulatory and control-oriented, emphasizing compliance with rigid bureaucratic procedures.

The following suggestions were made for improvement:

- The focus *of improved environmental management of aquaculture needs to be directed towards the local government units* and *increased responsibility given to farmers and farmer associations.*
- EIA legislation does not currently state directly that marine-based aquaculture activities are included. There is a need therefore to review the present scope of environmental impact assessment and ensure proper coverage of the environmental risks, both in terms of farming systems and ecosystems where farms might be located.
- Environmental assessment reports and monitoring information should be *made available via the internet and various publications.*
- The prospects for environmental impact assessment need to be reviewed in the light of national development interests and environmental objectives.

The implementation of the Joint Administrative Order (JAO) No. 1, series of 2008 should be a priority. In 2008, this JAO between the Department of Environment and Natural Resources (DENR), Department of Interior and Local Government (DILG) and the Department of Agriculture (DA) was adopted by the Department Secretaries concerned. It is entitled: *Defining/Identifying the areas of cooperation and collaboration among the Departments in the planning, management and control of aquaculture development to mitigate impacts on the environment.*

SMALL FISH PRODUCTION: SUSTAINABLE APPROACH TO AQUACULTURE OF NEPAL

Rama Nanda Mishra, Fisheries and Aquaculture Development Program

Aquaculture has a short history in Nepal. It is based on fish culture only. It is also the fastest growing food sector (8.5 percent). The risk of failure is very high, particularly for common access (public) fishponds, and there is no insurance coverage on aquaculture. The supply of local fish is decreasing day by day as the population is increasing. The demand for smaller size fish is currently increasing in local markets (local fish are smaller, so this is a way of identifying local products, and freshness). *The technique used is a modified polyculture system, with one species (typically a small rapidly growing indigenous species) heavily stocked and harvested four or five times each season, together with larger conventional aquaculture species.* The size of heavily stocked small fish at harvest is only 20 to 75 g, but this represents nearly a 50 percent contribution of the total production. *This system is popular amongst farmers and is being rapidly adopted* because the lengthy and complicated loan procedures of financial institutions have forced farmers to look for alternatives to higher investment, conventional, aquaculture systems.

AN OVERVIEW OF IMPORT RISK ANALYSIS (IRA) FOR FISH AND FISHERIES PRODUCTS IN INDONESIAN FISHERIES

Reza Shah Pahlevi, Ministry of Marine Affairs and Fisheries, Indonesia

The presenter provided information on *the Import Risk Analysis Regulation in Indonesia*. This regulation was issued on 21 July 2011. The rationale of the regulation is fish and fishery products could potentially be carrier media for the entry and spread of harmful pests and fish diseases. Its purpose is therefore to prevent the entry and spread of harmful fish pests and diseases, to protect fish resources and environmental sustainability, human health, fisheries and business continuity, and to avoid the risk of the danger that may result from the importation of fish and fishery products. The approval of the application for importation (under the regulation) needs historical, biological, socio-economic and environmental information. The application document needs to be approved by the relevant authorities in the country of origin.

The costs incurred in the implementation of risk analysis for the importation of fish and fishery products are charged to the state budget of the Ministry of Marine Affairs and Fisheries. For products related to fish and fishery products a risk analysis must be conducted as set forth in the IRA regulation.

The validity period of the letter detailing the risk analysis results is a maximum of one month from the date issued. Without this fish and fish products cannot be imported.

ASSESSMENT OF FISHERIES AND AQUACULTURE IN MYANMAR

Khin Maung Win, Department of Fisheries, Myanmar

The Myanmar fishery sector is a major component of the national economy and is an essential primary provider of animal protein for the people of Myanmar. Previous assessment programmes, mainly provided by FAO, focused specifically on the status of standing marine fish stocks in order to determine MSY, and to provide advice to policy-makers and fisheries managers on the optimum exploitation of marine resources. The presenter provided an overview of the assessment tools used in Myanmar, enumerating a number of projects that were carried out in recent years, including marine and inland fisheries pilot activities. There are however a number of constraints, most notably the lack of skills and technologies to carry out the assessments. Aquaculture assessments were undertaken ten years ago under a FAO-NACA mission and were used as requirements for licensing.

More recently, *comprehensive assessments in the fishery/aquaculture sector have also been undertaken by the government, NGOs, local and international organizations* (i.e. post Cyclone Nargis), for providing

necessary assistance to affected areas, used as *a baseline for the recovery response mechanism and later on for strategies for the rehabilitation of fisheries and communities*. The immediate needs for assessment programmes include market chain analysis, profit and loss and employment. The main constraints are the lack of methodological and analytical expertise; inadequate technologies (computer hardware and software), facilities and financial support. The capacity to undertake Environmental Impact Assessments (EIA) still needs to be developed in the country.

DISCUSSIONS OF THE WORKING GROUPS

Three working groups (Table II) were established for this part of the workshop. Each group nominated a facilitator and presenter for the feedback session. Rapporteurs were appointed from the resource persons. After the working group period was concluded there was a report back session with questions and answers. The findings of the plenary presentations (see Table III) were combined into a final summary of the workshop, presented in plenary, and opened up for final comments and discussions (this endorsed summary is presented at the front of this report).

WORKING GROUP COMPOSITION

Group 1 **Fishery East Asia/SCS**	**Group 2** **Fishery BOB/South Asia**	**Group 3** **Aquaculture – regional**
Abu Talib bin Ahmad	Mya Than Thun	Nelson A. Lopez
Jose A. Ingles	Sk Mustafizur Rahman	Kom Silapajarn
Chheng Phen	Abdul Khalil bin Abdul Karim	Reza Shah Pahlevi
Qiu Yongsong	Win Myint Maung	Rama Nanda Mishra
Nguyen Thi Trang Nhung	Khin Maung Win	P. Nimal Chandranatne
Worawit Wanchana	G. Mohana Pai	MMW R. Bandara
Amnuay Kongprom	Ghulam Muhammad Mahar	S. M. Pillai
Pich Sereywath	Diane Evans	Munir bin Mohd Nawi
Kao Monirith	Cahyani Dwi Setiawati	Nhu Van Can
Benjamin Francisco	J.S. Jayanatha	Cao Le Quyen
Alias bin Man	Md Enamul Hoq	Htun Win
Jotham Siprainus Ninef	Pradip Kumar Das	Weimin Miao
Jessica Munoz	Djoko Arye Prasetyo	C.V. Mohan
Andrew Jackson	Praulai Nootmorn	
Jesse Marsh	Tint Swe	
Richard Banks	Maria Åberg	
Duncan Leadbitter	Chumnarn Pongsri	
Don Griffiths	Graeme Macfadyen	
Jose Parajua	Rudolf Hermes	
Petri Suuronen	Rishi Sharma	

FISHERY WORKING GROUPS

Two subregional fishery working groups were formed: Bay of Bengal/South Asia subregion and the South China Sea/East Asia subregion. The fishery working group was asked to identify how to move from fishery assessment to management planning. The group was gives the following questions to consider:

- **How can we be more pro-active in initiating fishery management planning?**
  - Are Fishery Improvement Plans a good tool? What else is there?
- **In principle, can we agree that the four key components of a management plan would be:**
  - stock assessment (which tools? Screening for target or indicator species, data rich/poor methods (e.g. PSA));
  - a harvest strategy and management tools (e.g. management measures, mixed fisheries, transboundary stocks, province scale, national etc.);
  - ecosystem issues (bycatch mitigation, habitat effects, endangered species; and
  - governance (social/economic trade-offs, how to get fishery managers and local government onboard with the plan?).
- **What are the challenges or barriers facing us, in each of these steps?**
- **What are the solutions, ways forward, and how can they be facilitated?**

AQUACULTURE WORKING GROUP

The aquaculture working group was given a similar theme for its task, and was asked to consider how to be more pro-active in aquaculture management/development planning? Specifically, the group was requested to consider the following questions:

- *How can we be more pro-active in aquaculture management/development planning?*
  - Examples of tools are EIA, IRA, zoning, seasonal/spatial management, production projections, certification – are they sufficient? Are there others?
  - How to minimize impacts of unregulated development, disease transfers and movement, genetic impacts?
- *What are the challenges or barriers to getting these approaches into the mainstream? Consider:*
  - capacity building, awareness, compromises and trade-offs;
  - private sector buy-in , financial considerations, markets;
  - importing market demands;
  - weak regulatory framework; and
  - poor buy-in from the private sector.
- *What are the solutions, ways forward, and how can they be facilitated?*

Discussion on the South China Sea Working Group presentation

A comment was made that one must not forget about inland waters, as the earlier presentations seemed to focus strongly on marine fisheries. The meeting agreed that inland fisheries management is often especially weak, and noted that APFIC does have a remit for engagement with inland fisheries assessments and management improvements. It further noted that whereas some management issues may be similar in marine and inland fisheries, there are some management issues which may be specific to inland fisheries, for example because of multiple resource use and legal frameworks for water use.

In considering how to move things forward, the working group members noted that there is considerable capacity in the region in research and in university institutions to help inform management decisions and management changes. The BOBLME has a fisheries management committee under development and SEAFDEC also has technical committees, both of which might be useful mechanisms.

Discussion on the Bay of Bengal Working Group presentation

Following this presentation, it was noted by participants how strikingly similar the challenges and solutions were to those presented by group 1. It was also noted that many (e.g. India, Sri Lanka, Philippines, Bangladesh), but not all countries in the region, have started or completed management improvements and management planning processes already for key species/fisheries not based specifically on FIPs, and some examples were discussed. This suggests that there is an increasing willingness and awareness of the need for such improvements. However, many of these initiatives have been donor/project supported.

In promoting the use specifically of FIPs in the region, the meeting noted that there have also been a number of "real FIPs" so far, often driven by external market requirements. Developing and disseminating a standardized approach could encourage wider uptake of the FIP approach. WWF reported that they are in the process of developing a do-it-yourself manual which should be ready in 6 to 12 months, and they have already conducted a number of training workshops on MSC processes and FIPs.

It was observed that previous FIPs (e.g. in the Philippines) may not really have used the opportunities for local capacity development in the FIP process which they offered. It was also noted that many people from within specific countries are not aware of FIPs that have been completed, suggesting that dissemination of the results of FIPs and the processes involved is poor, thereby weakening the potential for replicability.

The issue of ensuring that the right people attend any training was noted as being important in effective capacity building in support of management improvements. It was also highlighted that increasing awareness of this process at the local level is critical, and it is especially important to engage the right industry and private sector partners at local levels.

Discussion on the Aquaculture Working Group presentation

The meeting observed that aquaculture developed so fast and so recently in the region that many countries do not have sufficient laws (especially at the local level) to manage aquaculture effectively. It is important therefore for governments both to improve existing legislation, and to anticipate more effectively future developments that might take place in the region (e.g. tuna ranching) so that the same mistakes are not made again and that effective legislation can be put in place in advance of such developments.

It was noted that fish feed represents a key linkage between the capture fisheries and farmed fish sectors, and a very important issue that needs to be addressed (as discussed in previous APFIC meetings).

It was observed further that there is generally less donor funding for aquaculture than for capture fisheries (except from development banks, particularly through loans to government), and that income from the aquaculture sector is not re-allocated back into management of the sector (and financing plans are seldom included in aquaculture strategies).

The discussion highlighted a point made in the earlier presentations that there are many existing assessment tools and models, but that they may need to be adapted for the region. NACA was suggested as being an especially appropriate organization to assist with the building of regional capacity development for aquaculture assessments and development planning. Off-the-shelf training programmes in aquaculture assessment methodologies are not really available in the region, and could be useful.

Almost all countries in the region have specific national aquaculture development strategies, although for those countries that do not aquaculture may be covered in their development or broader sectoral strategies.

SUMMARY OF THE FINDINGS OF THE WORKING GROUPS

How can we be more pro-active in initiating fishery management planning, and are FIPs and other tools a good idea?	
Group 1 **South China/ Sulu Sea group**	– National strategies are too broad and not sufficiently specific. There is agreement with the need for fishery management plans because: ❍ it is important to improve current status of fish stocks and to ensure sustainability to preserve the livelihood of fishing communities; ❍ it is necessary to minimize the negative impact on the ecosystem; ❍ it is important to establish specific activities that conform to a plan; and ❍ there is a need to provide a basis for monitoring and evaluating the agreed management outcomes. – Planning needs to define what we are going to manage and where we are – establish prioritization because of limitations in resources (human and financial), information, state of resources, capacity in place, and tools to be applied. – National Governments to set fishery specific strategic priorities for implementation of management planning, but actions delegated to provincial authorities where appropriate. – National Government agency to strengthen national policies to facilitate implementation. – Define overall management objective and fishery-specific goals based on combination of priorities.

	– Ensure commitment to transboundary/area management and ensure strong linkages between national government and decentralized authorities. – Set in place a framework for making decisions, inclusive of all stakeholders. – Stakeholder interaction will sell to government and promote ownership. – This can be facilitated better through co-management. – Fishery Improvement Plans useful both for scoping of fishery issues and laying out the design process.
Group 2 **Bay of Bengal and Indian Ocean**	– We should note that countries generally already have *national level management plans* that generally follow the CCRF and EAF. – FIPs or other tools presented in the workshop may be useful and appropriate for *local level fisheries-specific management planning.* – Different management styles for domestic and export fisheries. – Bangladesh has made management improvements for Hilsa without a formal FIP, but the process was similar in terms of stock assessment, then consultation with communities and stakeholder, etc. – Sri Lanka has developed management plans for sea cucumber, shrimp etc. These were underpinned by stock assessment and a co-management approach. – India has made management plans for the oil sardine fishery. – Indonesia has comprehensive plans for 2 of their 11 management zones, and others are under development. – *Noting the challenges,* approaches such as FIPs are useful.
In principle can we agree that the five key components of a management plan would be:	
Group 1 **South China/ Sulu Sea group**	**Information** – Better and more cost-effective ways of collecting data – use of fishing vessels, logbooks/catch certificates and scientific observers on commercial vessels. – Collect data at landing sites and from middlemen for small-scale fishers. – Provide basic services (positive incentives – technical advice, selective gear, ice) in exchange for information at landing sites on return trade data. **Stock assessment** – Stock assessment could be used and applied at different levels – formal and data-deficient (using PSA). – Use of local knowledge is critical and can be accommodated by applying data-deficient techniques. – Stock assessment parameters set and a continuous commitment to capacity building. – Stock assessment is not critical to FIPs, most people know that there are problems and a need for precautionary measures, but it will become important as plans are implemented, reviewed or updated. **Management strategies** – Need for multi-species and multigear strategies that reflect general mixed fisheries. – Transboundary management enshrines national and regional obligations to ensure compliance. – Transboundary bilateral management agreements or the use of subregional bodies are important in establishing management strategies, but management tools could remain independent. – Strengthening systems for allocation of fishing rights that acknowledge both traditional and commercial rights – removing the system of open access through licensing/registration.

	Ecosystem approach to fisheries management – Risk analysis undertaken to assess impacts on ecosystems. – Ecosystem actions need to ensure that management actions deal with all at risk species – vulnerable target and non-target species, dolphins. – National measures should establish no-fishing zones (protected areas and spawning grounds). – Protected species require transboundary cooperation. – Selective gears or banning of damaging fishing methods. – Promotion of eco-friendly fishing methods. – Implementation of RPOAs for protected species. – Information on vulnerable species needs to be strengthened as part of the commitment to improved data collection. **Governance** – Top-down: needs higher level educational commitment focusing on politicians. – Bottom-up: co-management process. – Consumer pressure. – Fishery specific management councils as principal advisory body to the Minister. – More effective use of transboundary regional cooperative arrangements (SEAFDEC, ASEAN) – Communication and educational awareness schemes. – Integrating economics and marketing issues into management decision-making and joint MCS programmes.
Group 2 **Bay of Bengal and Indian Ocean**	**General comment** – It would be useful to have a regionally consistent structure for developing Fisheries Management Plans, but which is flexible enough to allow for country specifics. **Monitoring and Evaluation (M&E)** – Very important and should have its own section in a FMP. **Stock Assessment** – Yes. First step has to be to better understand the state of the problem and knowledge of stock status is critical. Must include use of local knowledge. **Management tools** – Yes. **Ecosystem issues** – Absolutely yes. Must include climate change. **Governance issues** – Yes. Should include capacity development issues.
What are the challenges or barriers facing us in each of these steps?	
Group 1 **South China/ Sulu Sea group**	– Legal frameworks need strengthening. – Fisheries sector given low priority. – Need to strengthen capacity across the range of management activities – stock assessment, administration and compliance. – Lack of human and financial resources. – Insufficient stakeholder ownership leading to resentment and opposition to regulations.

Group 2 **Bay of Bengal and Indian Ocean**	– Making management changes given the low socio-economic conditions of fishermen. – Making recommendations that are relevant and feasible given fishermen's illiteracy, problems with enforcement, etc. – Lack of effective communication – even those educated fishermen may not always understand why a specific management tool is necessary, and language can be a barrier. – Lack of coordination and communication between national level policy-makers and local level. – Getting away from donor funding is critical and there is a real failure to institutionalize necessary actions. – Developing simple and cheap tools, especially given costs of stock assessment, as at the moment managers often don't have information to encourage policy-makers. – Addressing the fundamental weaknesses in stock assessment. – The regulatory changes that might need to accompany any FIP or other management planning/change processes. – Dealing with the problem of political influence/interference in management. – Shrinking human resources in both government and private sector. – Infrastructure weaknesses are also critical. – Addressing problems and implementation of plans is hard in the region because of the small-scale nature of many fishing activities, e.g. collection of accurate data. – Fisher concerns over providing correct information because of fears of taxation that might result. – Reducing IUU fishing, e.g. through use of logbooks. – Costs of effective enforcement. – Building capacity and human resources. – Complying with requirements in importing countries (sustainability, legislative requirements on health/hygiene and catch certification scheme). – Making importers aware of how difficult and costly it is to comply with requirements. – Organizational development – this is a long-term and very difficult process. – Making politicians aware that decision-making based on certainty may be difficult.
What are the solutions, ways forward, and how can they be facilitated?	
Group 1 **South China/ Sulu Sea group**	– Need to promote costs and benefits of impacts and the management plans. – Strengthen the knowledge of decision-takers – Improve management participation through local authorities and co-management. – Central and provincial government funding needs to prioritize its funding commitment to management plans. – Create a harmonized template for the design of fishery-specific management plans (APFIC). – Central governments to initiate capacity building but carried down through to decentralized level, which needs to be strengthened, inclusive of many stakeholder groups. – APFIC as a driver promoting management initiatives. – Regional Centre of Excellence, e.g. FAO APFIC in collaboration with NGOs and others, (SEAFDEC). – Create a regional and national pool of experts that would facilitate development of plans.

	– Encourage exchange of regional transnational fisheries knowledge and sharing in management planning processes for transboundary fisheries and/or fisheries with similar characteristics.
Group 2 **Bay of Bengal and Indian Ocean**	– Active regional cooperation. – Livelihoods support – a critical success factor. – FIP or similar tools (but must have government support to be successful). – Increased cooperation with fishers for accurate data, and acceptable and good sampling for management (cost effective). – Overhaul of statistical systems? – Build more effective fisher organizations within the sector. – Make appropriate changes to the regulatory system to improve effectiveness. – Replicability of successful initiatives and lessons learned. – Prioritization of key target species for management improvements (noting benefits for other species and habitats from such improvements). – Having assessment tools to test hypotheses of projected impacts of management improvements. – Capacity building and human resource development. – Identification, communication, and use of incentives (not necessarily financial, but can be) for management improvements. – Identification of sustainable financing mechanisms.
Group 3 – Aquaculture	
How can we be more pro-active in aquaculture management/development planning?	
The underlying reasons why we are currently not proactive are: – the initial focus of national planners in many countries of the region was primarily aquaculture development to increase production, earn foreign exchange, create employment and generate livelihoods; – aquaculture development was not well regulated in the initial stages; – aquaculture was largely traditional in nature and small-scale and this made planning and management difficult; – sustainability thinking was not a priority when the sector was being developed; – only when countries were faced with problems associated with aquaculture development (e.g. environment, disease, food safety, social inequality), did they start looking into assessment tools and regulatory frameworks; – only in recent years have national planners started thinking in terms of using assessment tools for decision-making and aquaculture development planning; – implementation of assessment tools requires expertise, financial resources, and legal framework which are often lacking in many countries; – only in the last decade have countries developed national aquaculture strategies and only countries with strong aquaculture strategies can think of implementing the assessment tools; – aquaculture development was very rapid and mainly originated from a traditional unregulated practice; – the government regulatory framework, knowledge generation and R&D has not kept pace with the rapid aquaculture development in the region; – the application of assessment tools for aquaculture was tested only in recent years; – many countries did not have the regulatory and policy framework for implementing the use of assessment tools; and – government regulatory framework has not kept pace with the speed of technology and the development of the aquaculture trade in Asia.	

What are the drivers for use of the assessment tools?

- Market forces and trade requirements.
- Food safety issues.
- Feed safety issues.
- Complying with national requirements and regulatory framework.
- Complying with international agreements and requirements.
- Long-term sustainability of the sector.
- Responding to the concerns of NGOs, consumers and general public.
- Responding to emerging issues such as climate change, disease emergence.

What are the types of assessment tools?

There are many assessment tools that can be used for aquaculture development/planning:

- EIA for the environment;
- surveillance for aquatic animal health;
- IRA for international trade;
- genetic risk analysis for biodiversity;
- ecological risk analysis for invasive alien species;
- residue testing, traceability for food safety;
- spatial planning for aquaculture development;
- zoning for carrying capacity;
- public and private certification for production process;
- life cycle analysis for greenhouse gas emissions;
- quality assessment for input quality (feed, seed, medicines); and
- Social Impact Assessment, value chain assessment for social and economic issues.

Is there a need for new tools?

There is no need to develop new tools. However, there is a need to examine how relevant and applicable the existing tools are for aquaculture planning and development in the region. There is also a need to modify existing tools to meet the regional requirements (e.g. traditional aquaculture, small-scale aquaculture, the diversity of aquaculture in the region).

What are the challenges or barriers to getting these approaches into the mainstream?

- Limited awareness about the tools.
- Limited awareness of the benefits of the tools.
- Limited human capacity for using the tools.
- Lack of scientific information for making full use of the assessment tools.
- Lack of incentives for using the tools.
- Limited financial resources (e.g. IRA commissioned by DOF Thailand costs close to 200 000 USD).
- Difficulties in applying tools for Asian aquaculture (e.g. scattered nature of the aquaculture, small-scale aquaculture, traditional aquaculture).
- Lack of clear responsibility for making use of the tools.
- Lack of legislative support for implementing the assessment tools.
- Limited knowledge and skills of workers in the aquaculture sector.
- Lack of national coordination through institutional arrangements.
- Economies of scale issue – production cost, cost of inputs.
- Lack of policy guidelines for private sector participation.
- Lack of effective dissemination strategies (e.g. field level extension).

What are the challenges or barriers to getting these approaches into the mainstream?

- Majority of the tools are developed outside the region, without the involvement of the region.
- Stakeholders in many producing countries think that the tools are being forced on them because of the trade dynamics.
- Long term benefits of application of these tools to farmers, the country, etc. not clear to all the concerned stakeholders.
- Existing tools – it is not clear if they are mandatory or voluntary, who is responsible for their implementation, etc.
- Lack of experience – it is only in recent years that countries have embarked on developing and implementing national aquaculture strategies, plans and programmes.

What are the solutions, ways forward, and how can they be facilitated?

- Build awareness on the usefulness of various tools.
- Build expertise at national and regional level for implementing the tools and monitoring the application of tools.
- Seek donors support for capacity and awareness building programmes.
- Seek national support for capacity and awareness building programmes.
- Encourage public-private partnership to support implementation of some of the tools.
- Encourage a participatory approach in implementing assessment tools.
- Demonstrate benefits of tools through success stories and case studies.
- Where possible, incentivize use of tools.
- Build capacity and awareness of stakeholders at all levels (farmers to policy-makers).
- Support development/revision of national aquaculture strategies so that the assessment tools are included in the national planning/development programmes of countries.

Recommendations

Considering the long term benefits of various aquaculture tools for promoting sustainable aquaculture development, the working group made the following recommendations:

- Initiate a regional process to evaluate the status of use of various aquaculture assessment tools in the region.
- Review the adoption rates of various assessment tools by different countries and evaluate the usefulness or effectiveness of existing tools for aquaculture development and suggest possible modifications for applicability in the region.
- Develop generic guidelines (e.g. for marine spatial planning) for use by countries in the region in order to encourage implementation of assessment tools.
- Make cost-benefit analysis of use of assessment tools and develop mechanisms for sharing them along the supply chain from producers to consumers.
- International and regional organizations consider developing a regional programme to support implementation of aquaculture assessment tools in the Asia-Pacific region.

ANNEX I – AGENDA OF THE REGIONAL CONSULTATIVE WORKSHOP

Regional consultative workshop on strengthening assessment of fisheries and aquaculture in the Asia-Pacific region for policy development

Yangon, Myanmar, 4–6 October 2011

Day 1	
08.30-09.00	Opening Ceremony Welcome & Opening Address – *H.E. Tin Naing Thein, Union Minister, Ministry of Livestock & Fisheries and Ministry of National Planning and Economic Development* Welcome – Simon Funge-Smith, Secretary APFIC
09.00-09.10	Group Photo
09.30-09.45	Workshop objectives/Agenda, adoption of agenda – Simon Funge-Smith
	Introduction to case studies of fishery and aquaculture assessments ***Objective:*** *Introduction to the purpose of assessments and reasons for their application in the fishery and aquaculture subsectors*
09.45-10.15	Orientation: Transition to Best Management Practices for Asian fisheries using sustainable fisheries and ecosystem approach principles: Assessment and scoping, Fisheries Improvement and Management Plans and programme design. *Richard Banks and Graeme Macfadyen, Poseidon ARM Ltd.*
10.15-10.45	***Coffee***
	Regional case studies on the practical application of assessments ***Objective:*** *Introduction to how assessments have been used in fisheries. Assessing the methodology applied – pre assessment leading to FIP and management plans & review critical areas of importance:* – *Stock assessment with subdivided subject headings – research capacity, data collection, stock assessment* – *Harvest control strategies and tools – desired strategies and fisheries management tools* – *EAF information, stock assessment and management* – *Governance issues – regulations, long term objectives, consultation and decision-making, fisheries specific management planning, compliance and performance review* – *Economic and social incentives – economic incentives and disincentives*
10.45-11.10	Where to from here? Prioritizing remedial actions identified in an integrated fishery evaluation *Duncan Leadbitter & Richard Banks*
11.10 -11.35	Bridging the Gap: Building integrated assessment models incorporating multiple sources of information. Where we are with Hilsa and where to go from here? *Rishi Sharma BOBLME*
11.35-12.05	Risk-based assessments in Malaysian data-poor fisheries *Abu Talib bin Ahmad, SEAFDEC Malaysia*
12.05-13.30	***Lunch***
	Country case studies of assessments ***Objective:*** *Review of ongoing country work. These are short (ten minutes maximum) presentations of a national example of fishery improvement, decision-making or stock assessment*

13.30-13.45	China
13.45 -14.00	USA
14.00-14.15	Malaysia
14.15-14.30	Cambodia
14.30-14.45	India
14.45-15.00	Thailand
15.00-15.30	***Coffee***
	Regional case studies on the practical application of assessments (cont.)
15.30-15.55	The IFFO Improvers Programme – a means to encourage and demonstrate commitment to the responsible production of fishmeal for aquaculture *Andrew Jackson, International Fishmeal & Fish Oil Organization*
15.55-16.20	Practical advice from lessons learned from FAO's work in fishery assessment *Petri Suuronen, FAO Fishery Department*
16.20-16.45	Encouraging fishers to take the lead on making management happen: a recognition scheme for providing incentives for action *Duncan Leadbitter, RFLP*
16.45-17.10	Responsible seafood sourcing – a private sector perspective *Maria Åberg, Abba Seafood AB, Sweden*
17.10-19.00	**Visit to Shwedagon Pagoda**
19.30	**Dinner hosted by Department of Fisheries, Myanmar and attended by Deputy Minister**
Day 2	
	Practical application of assessments (cont.)
08.30-08.55	Market drivers for MSC certification and how this incentivizes fishery improvement projects Jesse Marsh WWF-US
08.55-09.20	Results of the SEAFDEC pelagic programme *Worawit Wanchana, SEAFDEC*
09.20-09.45	Assessment methods to support Fishery Improvement Projects at two tuna handline fisheries sites in the Philippines *Jose Ingles, Tuna Strategy Leader, WWF CTNI*
09.45-10.10	Aquaculture and Import Risk Analysis (IRA) *C.V. Mohan, NACA*
	Country case studies of aquaculture assessments ***Objective:*** *Review of ongoing country work. These are short (ten minutes maximum) presentations of a national example of use of assessments in aquaculture management improvement or decision-making.*
10.10-10.25	Thailand (IRA) Kom
10.25-10.40	Sri Lanka (zoning/scheduling)
10.40-11.00	***Coffee***
11.00-11.15	Bangladesh (management, registration)
11.15-11.30	Philippines
11.30-11.45	Nepal
11.45-12.00	Pakistan
12.00-12.15	Indonesia
12.15-12.30	Viet Nam

12.30-13.30	***Lunch***
13.30-13.45	Timor-Leste
13.45-15.00	Myanmar
	Evaluation of assessment tools
	Objective: *Provide advice on how best to use or adapt assessment tools to respond to needs of the APFIC region*
15.00-15.15	Introduction to working group activities [presentation] group formation
	Simon Funge-Smith
15.15-16.00	**Recommendations on how to promote greater use of assessments, capacity building and networking needs**
	Objective: *Key lessons (positive and negative) on use of assessment tools and the constraints or limitations to their effective application. Networking and capacity needs are identified and opportunity for a regional community of practice*
	Working groups – Fisheries (Bay of Bengal/South Asia and South China Sea/Sulu Sea groups)
	Working groups – Aquaculture
15.00-15.30	***Coffee (served in working groups)***
15.30-17.00	Cont. of the working groups
Day 3	
09.00-10.00	Cont. of the working groups
10.00-11.00	Working groups presentation
11.00-11.30	***Coffee***
11.30-12.30	Plenary feedback
12.30-14.30	***Lunch***
14.30 -14.45	FAO GEF project REBYC-II CTI, Strategies for trawl fisheries bycatch management, objectives, challenges and outcomes, *Petri Suuronen, FAO Fishery Department*
14.45-15.00	**Action planning for APFIC member countries and regional organizations**
	Objective: The session, will develop recommendations and an action plan
	Introduction to the planning session – *Simon Funge-Smith*
15.00 -14.30	Summarize: – Key issues identified – Priorities – How can these be addressed at country level? – What regional options/opportunities exist?
14.30-15.00	Overrun
15.00-15.30	***Coffee***
15.30-16.30	Plenary summing up and adoption
Day 4	Half-day city tour of Yangon for participants with late afternoon flights.

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