Review of community-based ICM: Best practices and lessons learned in the Bay of Bengal South Asia
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Best Practices and Lessons Learned in the Bay of Bengal, South Asia
Review of Community-based Integrated Coastal Management:
Best Practices and Lessons Learned in the Bay of Bengal, South Asia

Dr. J. I. Samarakoon

with Maeve Nightingale, Dr. Rudi Hermes, Mr. B.L. Joseph, Dr. V. Salagrama
# Contents

ABBREVIATIONS AND ACRONYMYS ........................................................................................................................................................................ IV

ACKNOWLEDGEMENTS ................................................................................................................................................................................................ VI

ABSTRACT .................................................................................................................................................................................................................. VII

OVERVIEW ........................................................................................................................................................................................................ VIII

1. INTRODUCTION ............................................................................................................................................................................................................ 1

1.1 Community-based integrated coastal management and specific objectives of this review ................................................................. 2

1.2 CBICM and co-management defined .................................................................................................................................................. 3

1.3 Methodology and structure of the review report ................................................................................................................................. 4

1.3.1 How to read this review ...................................................................................................................................................................... 4

1.4 Evolution of the BOBLME programme – stages 1 and 2 .................................................................................................................. 5

1.5 Coastal geomorphological diversity and fisheries .............................................................................................................................. 7

1.6 Fishery stocks, statistics, law enforcement and land-based sources of impacts .................................................................................. 8

1.7 The nature of coastal fishing communities and small-scale fisheries .................................................................................................. 9

1.7.1 Demography & socio-economic conditions .................................................. 9

1.7.2 Lack of information available on contribution of small-scale fisheries ... 13

1.7.3 Developing coastal livelihoods – a key challenge .................................. 13

1.8 The context for the BOBLME project – implementation phase 2 .................................................................................................. 14

1.9 CBICM – a sub-component of the BOBLME programme implementation stage .................................................................................. 16

1.10 Ecosystem approach to fishery management (EAF) ............................................................................................................................. 16

1.11 Marine fisheries: the attributes of successful management – components of the reference model (RM) ........................................ 17

1.12 Mainstreaming co-management ...................................................................................................................................................... 19

1.13 Impetus to improvement of governance of small-scale fisheries: the UN-FAO committee on fisheries (COFI) resolution on small-scale fisheries in developing countries .................................................................................................................. 19

2. CASE STUDIES TO ILLUSTRATE COMMUNITY-BASED INTEGRATED COASTAL MANAGEMENT: BEST PRACTICES AND LESSONS AND ASPECTS OF LIVELIHOOD .......................................................................................................................... 21

2.1 Case study briefs ......................................................................................................................................................................................... 21

CS1. Bangladesh: Empowerment of Coastal Fishing Communities for Livelihood Security (ECFC) ........................................................... 22

CS2. Bangladesh: Law enforcement and social cost: postlarvae shrimp collection ................................................................................ ...... 23

CS3. Bangladesh: Fishery cooperative for sector modernization and livelihood uplift ............................................................................... 24

CS4. India, Andhra Pradesh: The Andhra Pradesh Fishermen Cooperatives Federation (AFCOF). ................................................................. 27

CS5. Sri Lanka: Evolution of fishery cooperatives – political imperatives versus fishery development .................................................. 29

CS6. Maldives: Territorial use rights in fisheries (TURF) for Maldivian Nationals in the Coastal Fishing Zone ................................................................. 31

CS7. Maldives: Exclusive use rights of ‘house reefs’ assigned to populations of inhabited islands .............................................................. 32

CS8. Sri Lanka: Estuarine Stake-net Fishery in Negombo Lagoon .................................................................................................................. 33

CS9. India, Andhra Pradesh Stake-net Fishery in Backwaters: Boddula-Chinna-Venkataya-Palem (Salagrama, 2003b) ................................................................................................. 36

CS10. India, Andhra Pradesh: shore Seine and Backwater Fisheries - Small Scale Fisheries - Dealing With Complexity and Change - A Comparison .................................................................................................................. 36

CS11. Sri Lanka: Shore Seine Fishery, Western, Southern and Eastern Coastlines ...................................................................................... 37

CS12. Special area management: Sri Lanka (IUCN, 2009) ............................................................................................................................... 38


CS15. India, Tamil Nadu & Andhra Pradesh, CB-FM in Pulicat Lake ............................................................................................................... 43

CS16. Sri Lanka, CB-FM in the nearshore Shrimp Fishery in Negombo ...................................................................................................... 44

CS17. India: the ‘Blue Revolution’ experience of Village Governing Councils – Tamil Nadu ........................................................................ 44

CS18. Bangladesh: Community-Based Coastal Resources Management in the South-eastern ........................................................................ 46

2.2 Analysis of the BOBLME-MA case studies: the reference model ........................................................................................................ 47

2.3 Clarification of meaning and content of terms in the reference model in actual practice ........................................................................ 51

Example 1: CS6. Maldives – exclusive fishing rights in the coastal fishery zone ............................................................................................. 51

Example 2: CS8. Sri Lanka, Estuarine Stake Net Fishery, Negombo Lagoon .............................................................................................. 52
REFERENCES ........................................................................................................................................................ 102
4. RETROSPECTION, CONCLUSIONS AND RECOMMENDATIONS .......................................................................... 93
3. ICM AND FISHERIES MANAGEMENT AND SOME BASIC CONCEPTS RELEVANT TO CBICM IN THE BOBLME-SA ........................................................................................................................................... 72
3.1 COMPLEXITY AND NESTED SOCIAL-ECOLOGICAL SYSTEMS ........................................................................... 72
3.1.1 The Complex Nature of the BOBLME - South Asia (BOBLME-SA) ........................................................ 74
3.1.2 The BOBLME - South Asia (BOBLME-SA): A Region of Disparities ....................................................... 74
3.2 ICM IN THE BOBLME-SA ................................................................................................................................ 75
3.2.1 Bangladesh: The Evolving National ICZM Programme ........................................................................ 75
3.2.2 India .............................................................................................................................................................. 77
3.2.3 Maldives: The emerging situation ........................................................................................................... 78
3.2.4 Sri Lanka – The Evolution of Coastal Zone Management ........................................................................ 79
3.3 SMALL-SCALE MARINE FISHERIES: TREND AND IMPLICATIONS FOR ICM ................................................................. 80
3.3.1 Understanding the Subdivisions of Small-Scale Fisheries for the BOBLME-SA ........................................ 80
3.3.2 Hidden relationships: Shared Resource Systems and Livelihood Implications ..................................... 82
3.3.3 Mapping fishing areas on continental shelves .................................................................................... 83
3.4 THE COUNTRY STATEMENTS ON THE EXISTING POSITIONS OBTAINED FROM THE REPORT OF THE APFIC’S REGIONAL CONSULTATION IN 2008 (APFIC, 2008) ................................................... 84
Bangladesh ....................................................................................................................................................... 84
India .............................................................................................................................................................. 85
Maldives ....................................................................................................................................................... 86
Sri Lanka ....................................................................................................................................................... 87
3.5 INTERNATIONAL DISCOURSE ON MARINE FISHERIES AND IMPLICATIONS FOR SMALL SCALE FISHERIES AND POVERTY IN THE BOBLME-SA ........................................................................................................ 87
3.6 CAN FISHING EFFORT BE EXPANDED IN THE BOBLME-SA EEZs? ............................................................... 90
Resource Rent in Fisheries (DFID, 2004) ....................................................................................................... 91
3.7 RISK, EXPOSURE AND CHRONIC DISASTER ................................................................................................... 91
4. RETROSPECTION, CONCLUSIONS AND RECOMMENDATIONS ........................................................................... 93
4.1 RETROSPECTION ........................................................................................................................................ 93
4.2 CONCLUSIONS ........................................................................................................................................... 96
4.3 RECOMMENDATIONS ........................................................................................................................................ 99
REFERENCES ........................................................................................................................................................ 102
### Abbreviations and acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Name</th>
</tr>
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<tbody>
<tr>
<td>AFCOF</td>
<td>Andhra Pradesh State Fishermen Cooperative Societies Federation</td>
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<td>APFIC</td>
<td>Asia-Pacific Fishery Commission</td>
</tr>
<tr>
<td>BCV Palem</td>
<td>Boddu-Chinna-Venkatay-Palem</td>
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<tr>
<td>BFDC</td>
<td>Bangladesh Fisheries Development Corporation</td>
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<tr>
<td>BJMSS</td>
<td>Bangladesh Jatiya Matshyjibi Samabaya Samity</td>
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<tr>
<td>BOBLME</td>
<td>Bay of Bengal Large Marine Ecosystem</td>
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<tr>
<td>BOBLME-SA</td>
<td>Bay of Bengal Large Marine Ecosystem, South Asia</td>
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<tr>
<td>BOBP</td>
<td>Bay of Bengal Programme</td>
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<tr>
<td>BOBP-IGO</td>
<td>Bay of Bengal Programme Inter-Governmental Organisation</td>
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<tr>
<td>BRAC</td>
<td>Bangladesh Rural Advancement Committee</td>
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<tr>
<td>CB</td>
<td>Community-based</td>
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<tr>
<td>CBO</td>
<td>Community Based Organization</td>
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<tr>
<td>CB-ICM</td>
<td>Community-based Integrated Coastal Management</td>
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<tr>
<td>CB-FM</td>
<td>Community Based Fisheries Management</td>
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<td>CBIFM</td>
<td>Community-based Integrated Fisheries Management</td>
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<tr>
<td>CBNRM</td>
<td>Community Based Natural Resources Management</td>
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<tr>
<td>CCD</td>
<td>Coast Conservation Department</td>
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<tr>
<td>CCRF</td>
<td>Code of Conduct for Responsible Fisheries</td>
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<tr>
<td>CEA</td>
<td>Central Environmental Authority</td>
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<tr>
<td>CFZ</td>
<td>Coastal Fishing Zone</td>
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<td>CFA</td>
<td>Coastal Fishery Zone</td>
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<tr>
<td>CIA</td>
<td>Central Intelligence Agency</td>
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<tr>
<td>CMZ</td>
<td>Coastal Management Zone</td>
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<td>CO</td>
<td>Community Organization</td>
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<tr>
<td>CODEC</td>
<td>Community Development Center</td>
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<td>COFI</td>
<td>UN FAO Committee on Fisheries</td>
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<td>CRZ</td>
<td>Coastal Regulation Zone</td>
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<tr>
<td>CS</td>
<td>Case Study</td>
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<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<td>CZ</td>
<td>Coastal Zone</td>
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<td>CZMP</td>
<td>Coastal Zone Management Plan</td>
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<tr>
<td>DFAR</td>
<td>Department of Fisheries and Aquatic Resources</td>
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<td>DFID</td>
<td>Department for International Development</td>
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<tr>
<td>EAF</td>
<td>Ecosystem Approach To Fisheries Management</td>
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<td>EBM</td>
<td>Ecosystem-based Management</td>
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<tr>
<td>ECDPM</td>
<td>European Centre for Development Policy Management</td>
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<td>ECF</td>
<td>East Ceylon Fronts</td>
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<td>ECFC</td>
<td>Empowerment of the Coastal Fishing Communities</td>
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<td>EEZ</td>
<td>Exclusive Economic Zone</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ESBN</td>
<td>Estuarine Set Bag Nets</td>
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<td>EJF</td>
<td>Environmental Justice Foundation</td>
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<td>EU</td>
<td>European Union</td>
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<td>FAO</td>
<td>Food and Agricultural Organization</td>
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<td>FCA</td>
<td>Fishery Cooperative Associations</td>
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<td>FMO</td>
<td>Fishery Management Organizations</td>
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<td>FSI</td>
<td>Fishery Survey of India</td>
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<tr>
<td>GBEF</td>
<td>Ganges Bramaputra Estuarine Front</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GEF</td>
<td>Global Environment Facility</td>
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<td>GNP</td>
<td>Gross National Product</td>
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<td>GO</td>
<td>Government Organizations</td>
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Acknowledgements

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The main compilation and analysis in the report was undertaken by Dr. Jayampathy Samarakoon, lead consultant, and supported by Maeve Nightingale, Coordinator Coastal & Marine Programme IUCN Asia. The report has also benefitted significantly from reviews of Dr. Rudolph Hermes, Chief Technical Advisor, BOBLME, Mr. B.L. Joseph, Fishery Expert, Sri Lanka and Dr. V. Salagrama, Fishery and ICM Specialist, Andhra Pradesh, India.

We thank the Food and Agriculture Organization (FAO) for their generous support.
Abstract

This document is a compilation and analysis of the literature on integrated coastal management and small-scale fisheries in the BOBLME South Asia, viz. Bangladesh, India, Maldives and Sri Lanka in relation to: (i) community-based fisheries and habitats management (ii) co-management and (iii) the creation of alternative livelihoods among fisher communities for the purpose of reducing impact on coastal resources. The contents of the report were initially reviewed at a Workshop in Colombo that brought together participants form the four South Asia countries. The final Review Report was reviewed by two experts from India and Sri Lanka and the Chief Technical Advisor, BOBLME Project.

The conclusions and recommendations in the report are based upon an analysis of eighteen case studies encapsulating the broad range of experiences in CB-ICM in the four countries including: a comprehensive approach to empowerment of coastal communities through co-management (Bangladesh), the failure of imposed fishery cooperatives (Bangladesh, India, Sri Lanka), the application of territorial use rights in fisheries (TURF) on a large scale in the major part of the EEZ (Maldives), along extensive stretches of coastal seas (India), in more restricted coastal seas (Sri Lanka), and also in partially enclosed estuarine waters (Bangladesh, India, Sri Lanka). The management of TURFs range from community-based practices, through to informal co-management, to formalized co-management with legal support provided by the state. Although effective management institutions exist, physical ecosystem change undermines and diminished fishery populations.

A ‘reference framework’ (RM) was developed to support the analysis of the case studies. The RM is based primarily on the FAO findings (including the ecosystem approach to fishery management, and opinions of fishery scientists). Assessment using the ‘reference model’ revealed both possibilities for livelihood and environmental benefits from strengthening existing practices, and the need for information to fill knowledge gaps. Acquisition of information may be most appropriately based upon the diagnostic approach to management of complex social-ecological systems. The existing forms of ICM in the SA region may not be amenable to the incorporation of community-based and co-management fishery practices into multi-stakeholder institutional settings. It would be feasible to aim at such incorporation only in the event that safeguards are in place to ensure that the small-scale fisher livelihoods do not continue to be marginalized by the ‘unintended consequences’ of planned development of fisheries and coastal resources in complex socio-cultural settings, based entirely on an export-oriented economic growth model that inadequately addresses equity and rights issues including women. Inadequate recognition is given in these development plans to the massive significance of traditional and small-scale motorized fisheries in local livelihood, national food security and nutrition. All South Asian fishery development planners envisage future expansion of fishing effort into unutilized parts of their EEZs and even beyond although the fishery science information may be inadequate. Illegal (IUU) fishing also remains to be addressed as a serious problem.

Little evidence exists of small-scale fisheries being mainstreamed into national policy and the national economy except in the case of Maldives. In Bangladesh, India and in Sri Lanka the interest of small-scale fisheries is inadequately incorporated into national planning because of deficiencies in economic valuation. The national interest and expectations from marine fisheries, and the FAO vision for small scale fisheries, now supported by the FAO Committee on Fisheries (COFI) proposed instrument for small-scale fisheries may converge through capacity building starting with a shared applied research agenda focused on livelihood (including adaptation to sea level rise), and the diagnostic approach required for assigning the proper economic value to respective socio-ecological systems and promoting the protection of critical ecological systems as part of a long term spatial planning approach.
Overview

This overview presents a simplification of the highly technical and complex substance of the Review of Community-based Integrated Coastal Management: Best Practice and Lessons in the Bay of Bengal, South Asia. It seeks to communicate that community-based integrated coastal management is an evolving process that is significant for the large concentration of poor fishing communities mainly in Bangladesh, India and in Sri Lanka and to a lesser extent in the Maldives. The diversities within the Bay of Bengal, South Asia are conspicuous and therefore eventual solutions to problems of livelihood stemming from the conflicts in the use of coastal environmental resources have to evolve through partnerships. These partnerships could occur between local organizations and their decision-making processes, and higher level institutions including government organizations resulting in meaningful co-management based upon the application of the ecosystem approach to fisheries management.

1. Introduction

This review synthesizes the status of community-based integrated coastal management (CB-ICM) in the Bay of Bengal Large Marine Ecosystem, South Asia (BOBLME-SA) consisting of Bangladesh, India, Maldives and Sri Lanka. Its purpose is;

- to present background information,
- to review existing best practices and
- to assess what enabling interventions are needed to strengthen CB-ICM in these four countries to provide sustainability to fisheries and fishery-dependent livelihoods.

The vision of the overall BOBLME Project is to ‘Improve the lives of the coastal populations of the eight participating countries in South Asia and in Southeast Asia through improved regional management of the Bay of Bengal environment and its fisheries’. Partnerships between government and local communities resulting in collaborative management (co-management) which is mainstreamed as a part of government administration is seen as the mechanism to achieve sustainability in fisheries. An estimated population substantially in excess of 20 million in the BOBLME-SA depends on fisheries for livelihood and food security.

The term CB-ICM, for the purpose of the review, is used as composed of (i) community-based fisheries and habitat management; (ii) co-management of fisheries, and (iii) the creation of alternative livelihoods among fishery communities. To avoid internal contradictions CB-ICM is further expanded thus:

- **community-based fisheries and habitat management** is where a group of people guides the use of a fishery resource system and associated ecological structures with a minor role played by government.
- **co-management of fisheries** is where a partnership among government, community of fishery resource users, external agents (NGOs, researchers, academics) and other stakeholders (boat owners, fish traders, tourism interest, etc) share responsibility and authority for decision-making (governance) in managing a fishery.
- **creation of alternative livelihoods** is the implementation of activities designed to reduce the adverse impact of harmful use of coastal resources, and to promote income opportunities within and outside the sector that contribute to enhanced wellbeing primarily of fishers and their households.
The main objective of the review is to extract lessons from case studies of best practices that could guide integration of fishery co-management including ecological systems, and sustainable livelihoods into the national development processes of government, i.e. mainstreaming. In this review, therefore, co-management describes the spectrum between the extremes of community-based management (with full devolution of responsibility to communities) to government-based management (with full responsibility controlled by the government). What generally exists are arrangement along the axis connecting the extremes.

The preparation of the report of the review of literature and experiences proceeded in stages, with feedback obtained from representatives of the BOBLME-SA countries, independent expert comment, review by the Chief Technical Advisor, BOBLME Project and discussion of findings at a SEA workshop. Each stage enhanced the sensitivity of the report to the priority problems and issues in the BOBLME-SA. The report consists of four parts: Part 1: Background and Introduction, Part 2: Analysis of case studies in community-based management and co-management of fisheries in relation to a 'reference model' developed from the literature, Part 3: Examines aspects of complexity of the BOBLME-SA, the status of ICM, the trends in fisheries and the relevance of international discourse on fisheries, and Part 4: Includes key lessons, conclusions and recommendations.

The present implementation phase of the BOBLME evolved through a preparatory stage which included national reports which addressed threats to the structure and functioning of the biophysical systems associated with fisheries in relation to FAO’s ecosystem approach to fisheries, as well as regional studies on critical habitats, land-based sources of pollution, shared and common stocks, legal and enforcement mechanisms and livelihoods. This review includes a review of the orientation provided by the national reports for Bangladesh, India, Maldives and Sri Lanka and regional studies.

The geomorphologic diversity and its significance for fishery productivity and coastal livelihood in BOBLME-SA is recognized. The major deltaic mangroves associated with the large rivers in Bangladesh and India provide significant multiple ecosystem services including fisheries, agriculture and protection against coastal hazards. Maldives has a small extent of mangroves mainly biodiversity interest. Shorefront mangroves are non-existent in Sri Lanka. The fringing mangroves that occur within barrier-built estuaries may sometimes impede the fishery function of these coastal ecosystems through sediment build-up. Coral reefs constitute the dominant coastal ecosystem in the Maldives. They are also significant in the Andaman and Nicobar Islands and in the Gulf of Mannar. Seagrass beds in the Gulf of Mannar are significant for fisheries and as a food source for the threatened dugong population there. Coral reefs are of lesser significance in Bangladesh, mainland India and in Sri Lanka. Therefore only cautious regional generalizations are possible.

Fishery statistics, except in the Maldives generally are unreliable. The changes from year to year may not be statistically meaningful for Bangladesh, India and Sri Lanka. Progressive increases in production may be more for satisfaction of political objectives rather than to reveal actual trends. Uncertainty in fishery statistics pertaining to artisanal and small scale fisheries is a serious concern. Whereas, the coastal fishery stocks are either already overexploited or near the maximum sustainable level, the national reports suggest scope for capacity expansion in offshore waters. The coastal waters that are significant for artisanal and small scale fishery livelihoods in Bangladesh, India and Sri Lanka are seriously affected by pollution from land-based sources. Fishery management efforts need to adequately address negative externalities of industry, agriculture and urbanization within an ecosystem approach to fishery management. Enforcement of existing fishery management laws requires strengthening.

BOBLME-SA has one of the largest concentrations in the world of coastal poor living on less than US$ 2 per day. This population of artisanal and small-scale fishers in Bangladesh and in India is increasing, but at a diminishing rate. A decreasing trend in the population engaged in small scale fisheries is
observed in the Maldives and in Sri Lanka. The total number, today, is substantially in excess of the 20 million reported by FAO in 2000. Artisanal and small-scale fishing in coastal waters continues to be an activity of last resort in Bangladesh, India and in Sri Lanka. Increasingly fishers in these countries are seeking employment as unskilled laborers in foreign countries. In the Maldives, however, poverty of a comparable form does not exist.

Women constitute about 50% of the total population involved in artisanal and small-scale coastal fishery activities. They are in serious states of deprivation in Bangladesh, India and in Sri Lanka caused by many social factors. In Sri Lanka women from poor fishing communities have contributed to poverty reduction through remittances from foreign employment. The poorer artisanal and small-scale fishers and their households are increasingly challenged by deepening poverty, food insecurity, as well as displacement. The differential adverse impact of fishery development policy on women requires particular attention.

Income poverty (below US$ 2 per day) ranges from about 40% in Sri Lanka to about 80% in Bangladesh and in India. The global increase in food prices and the falling income from fisheries impose severe challenges upon mainly the coastal poor. In the Maldives where poverty does not exist, under-5 child malnutrition, about 30%, is a challenge.

The axiomatic ‘law of unintended consequences’ imparts clarity to the root causes of the decline in livelihood and increasing poverty in artisanal and small-scale fishery-dependent coastal communities in Bangladesh, India and in Sri Lanka. This has occurred despite overall increases in rural income and purchasing power. Marginalization of artisanal and small-scale fishers largely may be explained as the unintended consequences of planned fishery development through modernization. The simplistic application of modern technology as a development intervention in the context of highly complex, coastal fishery socio-ecological settings were affected by uncertainties that were not adequately understood nor addressed as risks. This aspect is addressed more analytically in Section 4 in relation to future plans for fishery development. It is important to note that in the Maldives, fishery modernization directly included the small-scale fishers in the development process. Marginalization of their livelihoods, therefore, did not result. Conversely they have contributed to about five-fold increase in fishery production since modernization started in the early 1970s.

Quantified information is lacking on the actual contribution of artisanal and small-scale fishers to poverty reduction and food security at the local as well as at the national level. Employment provided to those fishers and fishworkers directly involved with fishing, the nutritional benefits to consumers, benefit from the multiplier effects of fishing, foreign exchange earnings from exports require to be systematically included in economic assessments of small-scale fisheries. Transforming coastal livelihoods from progressive decline to a state of sustainability is the key challenge. This requires conditions that would enable members of coastal communities to benefit from the five classes of assets, Viz. human, social, physical, financial and political in their relationship with coastal ecosystems.

The literature supports the strategic precedence given by the BOBLME Project to livelihoods. Sustainable management of small-scale fisheries means management of the people involved rather than fishery stocks. This implies improving the lives and livelihood of people following several generations of stagnation. Fishery development since the 1960s in BOBLME-SA has relied upon modernization of craft, gear and infrastructure, rather than the lives of the people involved, except in the Maldives. This approach has resulted in a significant increase in production both for domestic consumption and export. Meanwhile, the populations dependent on fisheries have more than doubled imposing growing pressure on the coastal environment. The attention of planners has increasingly shifted to integrated coastal management. Nevertheless, meaningful environmental safeguards are rarely enforced because of political implications of the social cost of restricted access to fishery resources. Thus, partnerships between fishing communities and the government leading to
co-management become significant if sustainable management is to be achieved. These carry legal implications. In this context, the many informal and semi-formal community-based practices that have worked well need to become incorporated into a flexible and appropriate framework that safeguards rights of access and build mutual trust. At the same time the legal arrangement would be required to give consideration to the ‘global crisis’ in fisheries and the role of the World Trade Organization.

Accordingly - The ‘Improvement of Coastal/Marine Natural Resources Management and Sustainable Use, including: promoting community-based management, improving policy harmonization, devising regional fishery assessments and management plans for *hilsa*, Indian mackerel and sharks, and demonstrating critical area management in selected areas - is one component of the BOBLME Project implementation which provides the rationale for this review.

The greater part of the relevant literature encourages fundamental reform of the fishery sector which includes harmonization of the small-scale fishery sector with coastal ecosystems while discouraging industrial fishing. Such an approach does not imply a reduction in economic growth which is essential for poverty reduction. The literature argues that economic growth is possible without marginalizing coastal livelihoods. This is supported by FAO’s ‘Vision for Small-scale Fisheries’. This vision in combination with the outcomes of many regional and international meetings provided the foundation of the ‘Reference Model’ used in this review for assessment of case studies.

The review of the literature and case studies places the future management of the small-scale fishery sector in the BOBLME-SA at a cross-road among (i) the existing situation with its trends, (ii) FAO’s Vision, (iii) global perception based on the existing ‘maritime fishery crisis’, and (iv) national perception of the future trajectory.

The ‘Reference Model’ for assessment of case studies for the BOBLME-SA in combination with recent expert opinion include the seven elements and the tools for sustainable management, Viz.:

- good governance,
- appropriate incentives,
- reducing demand for limited resources,
- eliminating poverty and providing alternatives,
- improving knowledge of complex systems,
- interactions of the fisheries sector with other sectors and environment, and
- tools of sustainable management.

The tools of sustainable management include:

- rights,
- transparent, participatory management,
- support to science, planning and enforcement,
- benefit distribution,
- integrated policy,
- precautionary approach,
- capacity building,
- market incentives.

The literature affirms that to proceed toward effective mainstreaming of fishery co-management based upon lessons from case studies the following attributes of a ‘fishery socio-ecological; systems’ are required:

xi
1. An enabling policy and legal framework,
2. The participation and empowerment of communities (and other users),
3. Effective linkages and institutions; and
4. Resources - a resource worth managing and the people and money to do it.

The resolution accepted at the 29th Session of the UN FAO Committee on Fisheries in February 2011 to implement an international instrument to support small-scale fisheries in developing countries has the potential to restore economic status and livelihoods of coastal communities.


The objectives of this section are:

1. To present a selection of case study examples that illustrate best practices in community-based fishery management (CB-FRM), co-management, and alternative livelihood development from the different ecological, geographic and socio-political contexts found in the BOBLME-SA Region.
2. Promote adoption of best practices in CB-FRM, co-management, and to assess the enabling factors that are needed to strengthen and replicate recognized best practice, aimed at understanding the requirements for mainstreaming.

The case studies are not exhaustive. Others may be assessed to bring out nuances using the same ‘Reference Model’.

Each case study represents a complex socio-ecological system (see Section 3 for explanation). Each socio-ecological system may be characterized by four attributes: (i) the resource system which portrays the ecological relationships in particular geographic settings – the ecosystem linkages, (ii) the number of resource units generated by the system such as the quantity of fish which then can be valued, (iii) the number of resource users involved which provides the scale of livelihoods that require management, and (iv) institutional / governance system in operation which would include information pertaining to mechanisms that exist for conflict resolution and maintaining the integrity of the resource base.

The case studies are referred to by the notations CS1 – 18. Only the reasons for selection of a particular case study are provided in this Overview. Details may be obtained from the narrative in the main text under the corresponding notation.

CS1. Bangladesh: Empowerment of Coastal Fishing Communities for Livelihood Security
The case study demonstrates a comprehensive approach taken by the government to mainstream fishery co-management. Assessment of sustainability not available.

This case study demonstrates the futility of seeking to enforce laws based solely on technical considerations. The social costs of law enforcement are intolerable in a political context.

This case study demonstrates the inability of co-management interventions to make positive contributions to social wellbeing when governance is flawed and decisions are imposed on fishing communities.

CS4 India, Andhra Pradesh: The Andhra Pradesh Fishermen Cooperative Societies Federation (AFCOF)
This case study demonstrates the inability of potential co-management interventions to make positive contributions to social wellbeing when governance is flawed and decisions are imposed on fishing communities. The information provided below is for the entire Indian coast of the Bay of Bengal since the cooperative structure is intended to benefit all the states.

CS5. Sri Lanka: evolution of fishery cooperatives – political imperatives versus fishery development. This case study illustrates, as in Bangladesh and in India, the manner in which government-imposed fishery cooperatives driven by political agendas have failed to improve the wellbeing of artisanal and most small-scale fishers.

CS6. Maldives: Territorial use rights in fisheries (TURF) for Maldivian Nationals in the Coastal Fishing Zone. This case study demonstrates the existence of fishery co-management in an area (about 500,000 km²) defined for territorial use rights in fisheries (TURF) which is about half the extent of the Maldives EEZ.

CS7. Maldives: Exclusive use rights of ‘house reefs’ assigned to populations of inhabited islands. This case study demonstrates the manner in which cascades of TURFs under CB-FRM, can exist as nested, coupled and hydrologically interconnected operational entities within the vast ocean space of an EEZ.

CS8. Sri Lanka: Estuarine Stake-net Fishery in Negombo Lagoon. This case study demonstrates the manner in which a co-management system with the five necessary attributes for sustainability operates with almost no transaction cost to the government. However, because of its geomorphologic attributes the system is being undermined by negative externalities from non-fishery land use. The system has been extensively analyzed by several fishery scientists.

CS9. India, Andhra Pradesh Stake-net Fishery in Backwaters: Boddu-Chinna-Venkataya-Palem. This case study demonstrates the convergence of fishing technology and management practices based on the similarity in geomorphologic settings. The resource system is relatively concentrated and definable within a spatial boundary. This facilitates the exercise of TURFs.

CS10. India, Andhra Pradesh: Shore Seine and Backwater Fisheries - Small Scale Fisheries - Dealing With Complexity and Change – A Comparison. The state has a coastline of 900 km with an estimated 870,000 fishers living mainly in fishing communities. Wide differences exist among these communities in regard to fishing systems, disposal, marketing, social, and political organization. Traditional fishery management systems have evolved in relation to the geomorphology and ecology of the bio-physical system. Geomorphologic drivers of two villages, Uppada and Boddu-Chinna-Venkataya-Palem (BCV-Palem), illustrate the effectiveness of traditional CB-FRM systems in the regulation of fishing practices. The specifics vary between the two systems.

CS11. Sri Lanka: Shore Seine Fishery, Western, Southern and Eastern Coastlines. This case study demonstrates the manner in which diminishment of restrictions on access rights imposes both economic and social costs. The situation is further undermined by facilitating unrestrained competition among traditional and modern fishing technologies.

CS12. Special Area Management: Sri Lanka. This case study was selected since it demonstrates that imposition of concepts that are not fully integrated with the structure and functioning of an ecosystem including geomorphology fails to provide sustainable results even in an approach which seeks to be participatory.
This case study was selected to demonstrate the potential for mutual cooperation and co-existence of both community interests and private sector interests, where the latter resort tourism, has become the primary driver of the Maldives economy.

This case study demonstrates the manner in which organized fishing communities (artisanal, traditional and semi-modernized) acquire the political strength to operationalize an extensive TURF without formal legal support. It also illustrates the manner in which organization and numbers can provide political power adequate for resisting manipulation by government interest combined with those of highly modernized, commercial fisheries.

CS15. India, Tamil Nadu & Andhra Pradesh, CB-FRM in Pulicat Lake
This case study demonstrates the need for social and cultural flexibility in CB-FRM to be able to adapt to socio-economic changes in the wider society.

CS16. Sri Lanka, CB-FRM in the nearshore Shrimp Fishery in Negombo
This case study was selected to demonstrate the feasibility of TURFs in open, nearshore coastal waters (not partially enclosed by backwaters and estuaries). Traditional knowledge enables establishment of a boundary for the TURF.

CS17. India: The ‘Blue Revolution’ experience of Village Governing Councils – Tamil Nadu
This case study was selected to demonstrate that even on the scale of a ‘state’ such as Tamil Nadu in India, appropriate participatory decision-making systems (governance) has the potential to exist within nested and coupled jurisdictions.

CS18. Bangladesh: Community-based Coastal Resources Management in the South-east.
This case study demonstrated that CB-FRM does exist in Bangladesh whereas the general literature on fisheries states that such systems do not exist. This illustrates the need for ‘searching’ field research.

Analysis of the case studies was done in two stages. Stage 1: Screening to determine the extent of correspondence with the Reference Model. Stage 2: Evaluation to determine the position of a case study as a ‘good’ or an ‘improvable’ practice. Three case studies, CS6, CS8 and CS14 were analyzed as examples to illustrate the forms of interpretation of the terms in the Reference Model as they were applied to attributes of particular examples.

Four main classes of limitations to mainstreaming co-management were illustrated by the above examples. (i) The geomorphological context and its influences on sustainability of co-managed and mainstreamed fisheries where the management area is a part of a larger ecological system. Sustainability in such situations is more influenced by geomorphology rather than governance. This indicates the need for application of FAO’s Ecosystem Approach to Fishery Management. (ii) The informal co-management of fisheries in the Maldives based upon the ‘Coastal Fishing Zone serving as a TURF’ has provided major benefits both toward national economic growth and wellbeing of fishers. Its sustainability depends largely on the commitment of the state and its resilience in the face of pressure from industrial fishing interests to remove access limitations. (iii) The sustainability of small scale fishing and existing community-based management based upon panchayats along the Indian coastline is being undermined by commercial shrimp trawling in contiguous areas. The discards from shrimp trawling, appears to erode a major part of the shared stocks being harvested by the artisanal and small-scale fishers who are members of panchayats. (iv) The case study from Bangladesh based on the estuarine set bag net fishery demonstrates the need for intensified research on CB-FRM in order to more comprehensively understand traditional practices.
The main findings and lessons from analysis of the case studies include:

- A majority demonstrate informal and formal TURFs, informal and formal government support by policy and/or legal mechanisms.  
  Lesson: lack of geo-spatial information for inclusion in national maps to formalize TURFs and to enable meaningful EAF.

- A few case studies that classify as better and improvable management practices occur in the oceanic waters of the EEZs. The majority of case studies are located in partially enclosed waters of backwaters and estuaries and in inshore coastal waters.  
  Lesson: The potential to increase production of artisanal small-scale fisheries from refinement of CB-FRM toward co-management in the coastal inshore waters where overexploitation is already evident is highly constrained or impossible. Simultaneously negative externalities from land-based sources of pollution and competing land uses are continuously diminishing the economic value of fisheries (rent dissipation).  
  Lesson: The Maldives case study is suggestive of the space into which inshore small-scale fishing may expand in Bangladesh, India and Sri Lanka. In these countries land is the major limiting factor that keeps pushing increasing numbers into artisanal fishing in coastal inshore waters.

- Reversals have occurred in the application of technology (switching back from mechanized to non-mechanized fishing) practices in some case studies where CB-FRM exists. Therefore technology by itself is not a guarantee of improvement in income, the total economic context matters.  
  Lesson: Introduction of technology may be more suitable in the wider context of the social-ecological system of small-scale fishers and within a more equitable development process.

- A substantial increase in fishery yields has occurred from oceanic fisheries in the EEZ in the Maldives. This may be partially attributed to the operation of rights / TURF. In India and in Sri Lanka, significant contributions to national fishery production have occurred from expansion of small-scale fisheries into offshore waters even in the absence of TURFs of a comparable form.  
  Lesson: The existing outlook that lives of small-scale fishers may improve mainly from refinement of management practices requires careful review. The potential of technology and capacity expansion into EEZs of Bangladesh, India and Sri Lanka in a manner that equitably benefits marginalized artisanal small scale fishers requires comprehensive testing by planned action.

- Diverse forms of rent dissipation are undermining traditional small-scale fisheries in estuaries, lagoons and inshore coastal waters.  
  Lesson: The diverse forms of rent dissipation have to be addressed, perhaps by way of rigorous application of EIA, law enforcement, and integrated land use planning / management within the framework of ICM.

- ‘Fishery cooperatives’ that can be an effective element in co-management become ineffective when imposed on fishing communities by governments even with the intention of facilitating livelihood uplift.  
  Lesson: Interventions that are excellent in concept and potential, fishery cooperatives entrain vicious circles (instead of virtuous circles) when implementation is flawed.

- The challenge of high concentrations of poor people in fishing as an ‘activity of last resort’ since they are placed in an ‘equity trap’ requires concerted attention. They disregard the law
to eke out a living. This creates aggravated ‘risk’ in the face of climate change consequences. 

**Lesson**: Recent catastrophes including the Asian tsunami 2004, Cyclones Sidr and Aila emphasize that risk reduction for exposed coastal populations must begin now rather than later.

Alternative livelihoods are an essential aspect of sustainable management of artisanal and small-scale fishers whose sources of income have diminished through a process of marginalization of their role in the fishery sector. The objectives for the review in this regard included:

- recognition of the opportunities and limitations for improving coastal livelihoods, and
- understanding the evolving approach toward imparting sustainability to coastal livelihoods.

A livelihood becomes sustainable when it becomes resilient to shocks and stresses both now and in the future. Alternative livelihoods, forms of income substitution such as cage culture, have been used in Bangladesh for effective management of the *Hilsa* fishery which included no-fishing seasons. The alternative livelihoods made management restrictions acceptable.

The literature reveals that elimination of poverty is essential for sustainable fishery management. The complexity of the task requires that governments need to apply compensation measures such as boat buy-backs as well as, education and skills training programs to produce lasting results. Alternatives categorize as:

- Within a community or outside, and by being extractive and non-extractive. Extractive options such as aquaculture may not be sustainable where fish need to be caught as feed, thereby increasing instead of decreasing fishing pressure.
- Policies to move fishing offshore, may not last, if they again move inshore creating problems in the longer term.
- Non-extractive options such as tourism may be available. Fishers need to have their capacity enhanced to benefit from them.

Generally it is assumed that raising income through alternative employment is an adequate response to the problem of poverty. However, experts note that raising incomes of marginalized small-scale fishers is not the only thing that counts in improving their lives. A range of basic services including education and health are also required. It is also the case that fishers prefer diversification within the sector. In the immediate aftermath of the Asian Tsunami 2004, fishers who had suffered from the impact chose to remain in the sector despite persistent exposure and risk since it out-competed other options in the fishers’ thinking.

Recent regional consultation in the Asia-pacific region concluded that diversification options had to achieve one or more of three objectives:

- **Economic accumulation**: improved incomes, asset base wellbeing of fishing and aquaculture-dependent people, poverty reduction and economic growth.
- **Reduced vulnerability**: reduced risk of failure, buffer against seasonality, shocks and adverse trends, e.g. climate change.
- **Reduced pressure on natural resources**: reduced fishing effort, reduced demands of aquaculture on ecosystem services.
- In parallel the consultation noted that evidence of successful diversification was limited because of weakness in monitoring of impacts.
The literature reveals a gap between the outlook of development planners and implementation of plans for livelihood development in the fishery sector. Problem of fisher marginalization was unintended outcome of development planning. This is because the consciousness that prevailed during the creation of a problem cannot be applied toward finding a solution to it. The divergence in consciousness becomes clear in a comparison between Bangladesh, India and Sri Lanka collectively with the Maldives. The development planners in Bangladesh, India and in Sri Lanka assumed that the demonstration effect of increased efficiency in fishing through modernization was adequate for transforming the traditional fishers to modern mechanized fishers. In the process an uneven playing field was created where a privileged few were provided incentives while the majority (the traditional fishers) were left to find their own way. The latter failed and languished. In the Maldives, in contrast, the traditional fishers constituted the human core that was trained and provided with capacity to modernize. Thus modernization did not result in marginalization of the existing traditional fishers in the Maldives. Whether or not the required change in consciousness now exists in Bangladesh, India and in Sri Lanka to overcome marginalization of artisanal and small-scale fishers remains a moot question.

Studies of the linkage between economic growth and livelihood enhancement in the fishery sector in Bangladesh and India revealed that:

- economic growth is essential for poverty reduction, and in principle growth as such does not seem to affect inequality,
- growth accompanied by progressive distributional change is better that growth alone, and
- education, infrastructure and macro-economic stability seem to positively affect both growth and distribution of income.

Therefore, a change in the consciousness of planners of fisheries development, now in a globalized world, to promote economic growth coupled to equitable distribution of income.

Solutions to the prevailing problem of marginalization of coastal livelihoods, through economic growth, must incorporate opportunities from other coastal land uses including aquaculture and protected areas linked to conservation of marine biodiversity. This may be achieved by minimizing or eliminating unintended consequences of planned development in the sector. Recent history demonstrates that both these areas of development and investment have resulted in aggravated marginalization of poorer coastal livelihoods:

Coastal aquaculture (shrimp): shrimp culture in Bangladesh began as a small-scale economic activity with many local benefits. It was later co-opted by development planning, supported by multilateral development banks, to become a predominantly private sector investment activity accompanied by brutality and criminality toward the small scale shrimp farmers. This scenario was also played out in India and in Sri Lanka. The opportunities from coastal aquaculture therefore requires future planning and implementation to safeguard equitable distribution of benefits from economic growth.

Protected areas: Expert opinion is divided on the role of marine protected areas as an instrument in fisheries management. Evidence exists that inadequately implemented protected areas further marginalizes artisanal and small-scale fishers where they are denied access to traditional fishing areas in order to conserve biodiversity.

Comprehensive approaches to livelihood enhancement through ‘poverty eradication’ instead of ‘poverty reduction’ are now being promoted primarily by the NGO sector which incorporates rights-based economic growth and ecosystem-based environmental safeguards. One example is illustrated in the ‘unifying framework’ of CARE International. The ‘unifying framework’ includes (i) Social

Micro-credit interventions: small loans issued without collateral to poor groups, primarily women; and micro-finance institutions (MFIs): organized lending institutions such as banks that extent credit to the poor based on collateral provided by organized rural entities are increasingly being recognized as mechanisms that can reduce income poverty. The NGOs play a major role in implementation of these interventions. These institutions reveal differing levels of organization and regulation in Bangladesh, India and in Sri Lanka. The highest level of organization, regulation and effectiveness is visible in Bangladesh. In India micro-credit and micro-finance, less regulated than in Bangladesh combined with self-help groups are also providing measurable benefits to the rural poor. The lowest level of organization and regulation exists in Sri Lanka. Ambivalent impacts of MFIs are now being reported, although rare, including suicides caused by usurious interest rates, inability to repay loans and pressure from the lender. Beneficial impacts of micro-credit and MFI loans are realized where intensive training, 'hand-holding' and monitoring are provided by participating NGOs. Necessarily, therefore, the transactions costs increase in proportion to the effectiveness of interventions.

The literature is inadequate about the benefits of micro-credit and MFIs in remote and illiterate coastal fishing communities. Nevertheless, cooperative movements such as the South Indian Federation of Fishermen's Societies (SIFFS) are demonstrating the delivery of benefits based upon cooperative operational principles to both men and women in small-scale fishery sector. This may be suggestive of possibilities that exist through cooperative interventions based on voluntarism.

3. ICM and Fisheries Management, and Some Basic Concepts Relevant to CB-ICM in the BOBLME-SA.

This section provides clarity to the material in the preceding two sections. Its objectives are to:

• provide a view of BOBLME-SA as a complex socio-ecological system in which exist coupled and nested sub-systems,
• indicate national disparities and pitfalls of regional generalizations,
• diversity in status of ICM,
• the trends in marine fisheries and hidden complexity of small-scale fisheries in their relationship with national expectations of sector growth,
• assess the relationship between the national positions in relation to the global discourse on the prevailing fishery crisis,
• indicate the relationship between increasing risk and inadequate recognition of the 'chronic disaster' that already exists in regard to environmental security,
• indicate the manner in which rent dissipation is further marginalizing the poorer coastal residents and exposing them to coastal hazards as unintended consequences of planned development.

The complexity of the BOBLME-SA flows from the combined effects of natural change, historical events, development planning, demographic change, land use pressure, fishing technology, scientific uncertainty and globalization. Within these complex relationships, effective CB-ICM seeks to enhance coastal livelihoods. Therefore it is appropriate to understand complexity as attributes of socio-ecological systems (SESSs) and to adopt a diagnostic approach toward determining the root causes of fishery decline and ecosystem degradation. Based upon this approach diagnosis may proceed on the basis of definition of SESSs in terms of attributes of (i) the resource system, (ii) the number of
economic resource units provided by it, (iii) the number of resource users, and (iv) the institutions involved in governance.

The BOBLME-SA is a region of extreme disparities. Regional generalizations matter little since both the problems of coastal ecosystems and majority of small-scale fisher livelihoods are situated within national jurisdictions. Poverty appears to be the most significant shared feature of the three larger nations, Bangladesh, India and Sri Lanka.

ICM exists in different forms of development in the region:

**Bangladesh** seeks to formalize ICM gradually in its vast, defined coastal zone which covers an area of about 47,000 square kilometers (32% of the country) in which live about 35 million people. About half of the population of the coastal zone live in the segment demarcated as the ‘exposed coastal zone’. The policy goal of ICM is to ‘... to create conditions, in which the reduction of poverty, development of sustainable livelihoods and integration of the coastal zone into national processes can take place’.

**India** declared a legal Coastal Regulation Zone (CRZ) in 1991 which assigned the responsibility of accordingly developing coastal zone management plans to each coastal state. The CRZ provides jurisdiction over a narrow strip of land extending 500 meters from high tide line. The CRZ has been reinstated recently (2009) and provides tighter regulation of development and land uses. This form of enforcement, however, will be more tolerant of land uses within the CRZ by coastal fishing communities.

**Maldives** with its widely scattered 200 inhabited islands regards the entire state as being an archipelagic coastal zone although a formal ICM process does not exist.

**Sri Lanka** has a dedicated Coast Conservation Department (CCD) which is mandated with responsibility for implementing the national Coast Conservation Act since 1981. A narrow strip of land and sea, extending 300 meters landward and 2 kilometers seaward constitutes the legal Coastal Zone. The CCD regulates land uses mainly within the legal coastal zone with community participation where necessary in regard to critical coastal habitats.

Information pertaining to small-scale fisheries is provided mainly to indicate trends and relationships with, coastal shrimp trawling, illegal, unreported and unregistered fishing carried out with private sector partnerships in the EEZs, and the export trade in fishery products.

All fisheries in the BOBLME-SA classify as small-scale fisheries by being below the overall length (OAL) of about 25 meters, although the precise definition continues to be debated at the WTO (http://www.wto.org/english/forums_e/ngo_e/posp72_www_e.pdf). However this hides internal differences that are significant to coastal livelihoods. The small-scale fisheries in Bangladesh, India and Sri Lanka consist mainly of two classes:

Category A - artisanal non-motorized craft, motorized traditional craft and motorized modern craft which are engaged in nearshore coastal fishing, and

Category B: the more modernized coastal shrimp trawlers and offshore fishing craft. The main interest in development planning in the fishery sector as well as investment in infrastructure has been focused on Category B which mainly serves elite interests and brings foreign exchange through export earnings.

The Maldivian fishing fleet is almost entirely composed of small-scale, modernized, motorized craft engaged in oceanic fishing.
CB-ICM in Bangladesh, India and in Sri Lanka directly will impact the populations engaged in Category A fishing. They far outnumber those in category B in terms of providing employment and livelihoods, produce more fish that directly enters the supply chain to local and national consumers as food, use a relatively insignificant quantity of fossil fuel, they are less capital intensive, and appear to have a lesser impact on coastal ecosystems. CB-ICM also would have a significant impact on shrimp trawlers that constitute a part of Category B while having a lesser impact on the other part, the fishing craft that operate offshore. Despite the major contribution to employment and food security by small scale fishing in Category A, national development planning has focused almost exclusively on Category B because it serves elite interest and earns foreign exchange through exports. In the event that this dichotomy persists, Category A fishing will continue to be marginalized with dire consequences for a majority of coastal livelihoods. Some adverse impacts that may emerge from the relationship between Category A and Category B fishing if not managed within the framework of CB-ICM include:

- erosion of fishery stocks on which the Category A fishing depends by expanded shrimp trawling in Bangladesh and in India,
- fishing down the food chain, already demonstrated in India may continue, although this may contribute to an expansion of shrimp stocks,
- quantity of discards through shrimp trawling could increase in India,
- in the event that capacity for shrimp fishing in Bangladesh is expanded as intended without safeguards, artisanal fishers may decline,
- displacement of fisher communities by competing land uses including industry and tourism,

Mapping of coastal fishing areas, as it has been partially done in Bangladesh, demonstrates a technique for characterization of sensitive, nearshore coastal sea beds for integrated management of competing fishing methods with differing efficiencies, within a CB-ICM framework. Such demarcated areas supported by allocation of use rights (limitation of access) may contribute toward balancing impacts of competing fishing methods aiming at sustainable co-existence.

All BOBLME-SA countries are planning expansion of fishing effort to benefit from export markets. Bangladesh and India already rank among the top ten fish and fishery product exporters for the international market. Their main increased export is expected to be shrimp from their extensive continental shelves. The national reports suggest that all four countries are also planning expansion of offshore fishing both in their unutilized parts of the EEZs as well as beyond. At present considerable IUU fishing is reported to be occurring there because of their limited national capacities for monitoring, control and surveillance (MCS). The technical information and trend statistics are not clear that support the potential for expansion, and the equitability of benefits that may flow expanded production toward enhancement of coastal livelihoods. The growth of fishery production from offshore fishing in the Maldives since the early 1970s, and the more recent positive results of expansion of offshore fishing by Sri Lanka’s small-scale, multiday boats appear to be attractive to Bangladesh and India.

International discourse has increased about the growth of the marine fishery sector in developing countries and its consequences. The important events in this process include:

- spilling over of fishing interests from industrialized countries to developing countries following peaking of production in the former since the 1970s,
- operationalization of EEZs under the UN Law of the Sea regime,
- massive subsidization of the marine fishery by both industrialized and developing countries,
- the reduction by almost an order of magnitude of the catches of large fish since industrial fishing began,
The increasing flow of seafood from developing countries to industrialized countries and associated foreign exchange earnings,
the increase in proportion of the world's forage fish being diverted as aquaculture feed for high-value carnivorous fish.

The prevailing crisis in the marine fishery is partially masked by aspects including, massive over-reporting of catches by China, decreasing wild catches being pooled with aquaculture production, seafood demand in developed countries being met increasingly by imports from developing countries, and assertion by government-affiliated scientists that a problem does not exist by ignoring contradictory evidence. Proposed remedies include marine protected areas, marketing of eco-labeled products from sustainable fisheries, removal of subsidies among others. Erudite reviews of the problem and solutions in the recent literature conclude that no single management process from among the ten standard approaches in fishery management provide an adequate answer, and therefore a consolidated, combined approach is needed.

Resource rent is noted as the key concept that drives overexploitation in fisheries, while simultaneously determining the potential economic and social benefits that can be derived from a managed fishery. Where inadequately recognized, the 'tragedy of the commons' results from competition and through rent dissipation. This implies the need for property rights and rules of access to fishery resources. Implementation of adequate and sustainable solutions depends upon both economic and political considerations.

Recent catastrophes caused by the 2004 Asian Tsunami, cyclones and other hazards provide compelling evidence for the need to address risk, exposure and chronic disaster (in contrast to acute disasters) in relation to coastal livelihood in the BOBLME-SA. Bangladesh, India and Sri Lanka already have chronic disasters on their hands in the form of increasing concentration of the poorest populations in coastal areas for the lack of opportunity to live in safer areas, despite an impending increase in frequency of coastal hazards associated with global warming.

4. Retrospection, Conclusions and Recommendations

Retrospection serves to ensure the focus and emphasis on livelihood of coastal communities as the core problem. The five decades, since the 1960s, include three distinct stages of fishery development: (i) pre-modernization; (ii) modernization, and (iii) post-modernization coupled with globalization. The questions pertaining to change during these stages are:

1. Why has the wellbeing of traditional and partially mechanized marine small-scale fishers declined, while the intended goal was improved livelihood through modernization?
2. Have any countries improved the wellbeing of small-scale fishers through policy?
3. What key concepts supported policies that improved the wellbeing of small-scale fishers?
4. What key ingredients in development economic policies contributed to enhanced well being of small scale fishers?
5. What conclusions may be warranted with regard to reliability of similar changes during the BOBLME Stage 2 Programme?

The answers and discussion related to these questions form the basis for the overall conclusions in this review, and provides information for further discourse at regional and national level. The following answers 1-5 follow the sequence of questions as they are presented above:

1. Why has the wellbeing of traditional and partially mechanized marine small scale fishers declined, while the intended goal was improved livelihood through modernization?
Answer: The participation of traditional small scale fishers was regarded as a means to an end, i.e. their participation would increase fishery production on a national scale through modernization. The
socio-economic wellbeing of the fishers was inadequately regarded as an end in itself in parallel with increased fish production. Introduction of modernization technology was a simple approach to development within a social-ecological system which was complex and contained many uncertainties. Therefore marginalization of small-scale fisher livelihood was an ‘unforeseen consequence’ of planned development. The causes that lead to such unforeseen consequences are included in the main text.

2. Have any countries improved the wellbeing of small-scale fishers through policy?
Answer: The answer must be considered in combination with a caveat – the role of subsidies in the particular examples are not provided as justification for continuation of the same as they now exist, particularly in small scale commercial, and industrial fisheries. The development of fisheries and fishery livelihood in Canada, Norway and Iceland during 1930 – 1980 included subsidies, both physical and financial, to fishing communities and fish processing plant workers for improvement of the socio-economic conditions and provision of social security arrangements. These state interventions had a significant impact and greatly enhanced the livelihood security of communities dependent on fisheries.

3. What key concepts supported policies that improved the wellbeing of small-scale fishers?
Answer: The key conceptual factors include: (i) Development planning in fisheries inclusive of interventions targeting the small scale fishers as beneficiaries; and (ii) Capacity development ‘to adjust out of the fishery’ when fishery stocks diminish, or the provision of livelihood resilience independently of fluctuations in natural stocks and growth in coastal human populations.

4. What key ingredients in development economic policies contributed to enhanced well being of small scale fishers?
Answer: The key development economic policies can be regarded as: (i) A law and order situation which guarantees property safeguards and the application of resource rents that prevent rent capture by politically oriented interests at the expense of the small scale fishers. (ii) Organization of small scale fishers, their empowerment and awareness building leading to adequate public pressure that compels legislators to react.

5. What conclusions may be warranted with regard to reliability of similar changes during the BOBLME Stage 2 Programme?
Answer: Public policy with regard to small-scale fisheries cannot remain to be the domain of political authorities. In the absence of public pressure there is insufficient reason, motivation or incentive for policy changes to be made on the basis of scientific evidence alone. Capacity building would result in empowerment, organization and advocacy leading to compelling public pressure.

Conclusions
The conclusions are drawn from the case studies in relation to the FAO Vision for Small-scale Fisheries, and the “reference Model’ for case study analysis.

1. Economic growth is necessary to reduce poverty at the national level. Integrated coastal development planning is necessary to ensure equitable sharing of benefits from coastal resources. In the absence of a mechanism for integration of traditional fishers this resource user group will continue to be marginalized despite their significant contribution to food security, despite economic growth at the national level.

2. Community Based Integrated Coastal Management (CB-ICM) which implies the integration of coastal resources management and fisheries management within FAO’s Ecosystem Approach to Fisheries (EAF) does not exist in the BOBLME.
3. CB-ICM with stewardship of local communities is adequate where the ecological system and competing uses are limited. Where the scale of the ecological system and uses increase, co-management partnership with the government becomes necessary.

4. A variety of different approaches to coastal resources management (ICM) exist in the four BOBLME-SA countries; lack of uniformity is associated with differing national priorities.

5. The examples of CB-FRM and Co-management analyzed in the review (except the fishery cooperatives) embody limitations of access in various forms. This is the precondition for sustainability of fisheries. Co-management will consolidate sustainability.

6. The coastal resources management processes are not integrated with the land uses that cause negative externalities (e.g. land based sources of pollution) as required in FAO's EAF.

7. Overfishing is evident from applicable indicators in the near shore coastal waters of Bangladesh, India and Sri Lanka which has adverse impacts on the livelihood interests of traditional mechanized and non-mechanized fishers.

8. Fishery modernization has resulted in increased production which has disproportionately benefitted the external investors in production and marketing rather than the traditional producers. This process of change may continue unless livelihood safeguards are available to the marginalized traditional producers and associated women in the supply chain.

9. Marginalization of the small-scale fishery sector through the lack of their representation in development decision making processes will continue until deliberate policy choices are made to reverse this pattern.

10. The existence of property rights (informal and/or formal) alone does not guarantee a reversal in marginalization trends. In spite of the existence of CB-FRM and co-management practices the vast majority of traditional fishers lack recognition. Measures are required for providing identity to them in terms of their economic role in food security, and their fishing areas toward providing definition to their social-ecological systems.

11. The livelihood problem associated with traditional fisheries is massive and looming in terms of socio-economics, and in the face of increasing risk from coastal hazards linked to climate change and sea level rise. This problem has to be addressed firmly and steadfastly by way of: education, health, infrastructure for life and security, empowerment including women, marginalized groups, and access to upward social mobility.

12. Many marginalized coastal/ fisher communities are in a chronic poverty trap which results in progressive increase in their level of deprivation (creeping normalcy). This requires recognition at the national level as a chronic disaster which may combine with acute coastal hazards (those to which a time and date can be given) resulting in catastrophes.

13. The remote and dispersed nature of coastal/ fisher communities/settlements which are inadequately serviced with infrastructure has obstructed movement into other occupations i.e. poor access to education, health, alternative employment opportunities etc.

14. High levels of income poverty and lack of access to alternative means of income have caused displacement and transfer of responsibility for family health and nutrition to women heads of households. This is particularly the case in Bangladesh and in some of the Indian states.

15. In the context of national development, expansion of fisheries into offshore waters within EEZs is perceived as an approach to benefitting from global fishery trade. The process of expansion is either being planned or it is already occurring although reliable trend statistics and meaningful information on the complexity of ecological systems are lacking. A precautionary approach is required.

**Recommendations**

1. CB-FRM and co-management practices exist in traditional fishing communities at different geographic and institutional scales. Despite the impacts of fishery modernization and economic growth in the fisheries sector these practices have demonstrated resilience. Their consolidation will contribute toward realization of their full potential to support sustainable livelihood for coastal/ fisher communities. They need to be provided with an identity.
2. The process of change in coastal resource use results from a sharing of resources among many sectors and needs to be planned. In development planning there is a need to create equitable opportunity for traditional fishers to benefit. Appropriate governance with participatory decision making is required to minimize conflict and ensure equity in benefits sharing for all stakeholders. Enabling mechanisms need to be implemented e.g. integrated planning processes, local capacity building to respond to opportunities, to encourage participation since change that benefits the powerless cannot occur spontaneously.

3. It is important to take measures to consolidate and safeguard existing CB-FM and co-management practices (whether formal or informal) to ensure that they become effective even in the absence of fully fledged national ICM mechanisms/ policy. This must be a priority. It is feasible to anticipate that the political (group) demand for ICM would emerge from the stakeholders currently participating in CB-FM and co-management processes as they become knowledgeable about the ecosystem approach to fisheries management (EAF). A number of practical steps can be taken to consolidate and strengthen existing CB-FRMP and co-management practices;

i. Awareness and knowledge workshops may contribute to the acceleration of CB-ICM.

ii. Research to define social ecological systems that demonstrate CB-FRM and co-management. Research would incorporate four fundamental attributes: (i) the resource system and its ecological linkages, (ii) the number of resource units generated by the resource system, (iii) the number of resource users and (iii) the institutions that support management.

Mapping processes that recognize and document the nature of existing CB-FM and co-management practices in Bangladesh, India and Sri Lanka are critical steps towards establishing a foundation for sustainable resource management. Such mapping (which would include information on fishing areas, distance from the shore, bathymetry and sea bed features) will result in the allocation of a geospatial identity for the traditional fisheries sector. This is an essential first step towards empowerment. National policy reforms are required for mapping the distribution and resource use patterns of coastal resources by the traditional mechanized and non-mechanized fisheries sector.

iii. Socio-ecological entities (groups and organizations) empowered by knowledge of the system attributes provide a step toward the development of networks and federations that then have the subsequent ability to acquire political power.

iv. Economic valuation of the contribution by traditional fisheries (to employment, nutrition/food security, gender aspects etc.) needs to be researched and demonstrated to national policy makers. Demonstrating economic contribution of CB-FRM and co-management practices to the local and regional economies in terms of food security and employment would be persuasive for the state to support dedicated policy promoting co-management practices and to bear the transaction costs of formalizing co-management.

v. In the Maldives consolidation of existing co-management in the coastal fisheries zone requires safeguards against IUU fishing and other forms of fishing driven by vested interests such as ‘industrial fishing’.

4. Reversal of the marginalization of traditional mechanized and non-mechanized fisheries requires the recognition of traditional fishers as a sector in their own right and the targeting of initiatives that will support their needs and interests. The key steps towards achieving this include: (i) providing geospatial identity to each entity which embodies CB-FM and (informal) co-management. (ii) policy reforms that target these recognized geospatial entities. (iii) zonation
that accommodates co-existence of such entities alongside other competition for resource use and space (iv) monitoring and enforcement of regulations.

5. Regulations are required to provide territorial use rights in fisheries (TURFs) to stakeholders who are participating in CB-FRM and co-management. Local understanding of legislation governing resource management is an essential underpinning for this to take place because regulations pertaining to fisheries and to coastal resources management fall within ambit of many agencies. This requires support through collaboration among responsible government agencies both at the national and local level.

6. Improving livelihoods. Initiation of processes for the provision of identity to migratory households/ groups located in remote areas. This is important since many of them do not have permanent addresses. This is particularly important for itinerant or migratory groups that are mobile in order to bring them into poverty reduction support programmes. National programmes are now underway for poverty reduction in the context of Poverty Reduction Strategy Papers (PRSPs) and other similar interventions. Transfers of benefits can occur to marginalized fisher communities only to the extent that they can be identified.

7. Capacity development to enable communities to access services provided by micro-finance institutions is a key practical step which can allow households and community groups the option to diversify livelihood/ income generating opportunities. This can become the basis of voluntary cooperative development as a process that has the potential to offer significant positive change for community groups through economic and political empowerment.

8. Potential exist for public-private partnerships between coastal tourism investors and fishing communities through mutually beneficial relationship between the two sectors, the public right of fishing communities to access the sea and the cultural interest factor for tourism that fishing communities bring. Government policy could provide a foundation for co-existence.

9. Global/ export demand for aquaculture products can lead to land capture by investors and the marginalization of traditional inhabitants, often fisher communities. Therefore policies that promote expansion of aquaculture must be designed with institutionalized safeguards.

10. The design and implementation of protected areas should be done in a participatory manner and be based upon considerations of access for traditional fishers to the fisheries.

11. Microfinance institutions (MFIs) / microcredit interventions are demonstrating effectiveness for providing financial support for alternative employment and diversification of livelihood. The initiatives of NGOs have acquired support from government and banks because of proven effectiveness. Many traditional fishing communities lack capacity to access such financial programmes because of inadequate training and/or education. Regulation coupled with incentives, however, is required to ensure that the MFIs do not resort to usurious practices as suggested by recent events of suicides.
1. Introduction

This review aims to synthesize the status of community-based integrated coastal management (CBICM) in the Bay of Bengal Large Marine Ecosystem, South Asia (BOBLME-SA) consisting of Bangladesh, India, Maldives and Sri Lanka. Its purpose is;

- to present background information,
- to review existing best practices and
- to assess what enabling interventions are needed to strengthen CBICM in these four countries to provide sustainability to fisheries and fishery-dependent livelihoods.

Partnership between government and local communities resulting in co-management is regarded as a necessary mechanism to achieve sustainability. Mainstreaming strengthens sustainability. It occurs when the co-management partnerships are institutionalized as a part of government administration. By way of mainstreaming, reliance on ad-hoc projects and unsystematic interventions is eliminated (APFIC, 2005).

‘Governance’ and ‘institutions’ are terms frequently used in this review and therefore require clarifications. Governance represents the process through which decisions are made. It is different from government which consists of a group of people within a sovereign state responsible for making and enforcing policies and laws by way of administrative organizations. “Fisheries governance is the sum of the legal, social, economic and political arrangements used to manage fisheries. It has international, national and local dimensions and includes legally binding rules as well as customary social arrangements (FAO, 2001). The establishment of institutions, policies and processes through which management may be realized is fundamental to effective fisheries governance. Institutions are the sets of rules and arrangements (public and private, formal and informal) affecting a fishery, as well as the organizations that develop and implement those rules” (Fishery Management Science Programme Policy Brief 5, http://www.mrag.co.uk/Documents/PolicyBrief5_Governance.pdf).

Implicit in exploring best practices in the management of marine resources is increased understanding of the humanity of the total event, i.e. the nature of the experience of people whose lives are embedded in the use and in the management of coastal resources. These are the resources that support their own survival, expectations for their families and enhancement of well-being in terms of living the life they value and have reason to value (Sen, 1995; 1999). This is encapsulated in the vision of the current Bay of Bengal Large Marine Ecosystem Programme Stage 2, viz. 'To improve the lives of the coastal populations of the eight participating countries through improved regional management of the Bay of Bengal environment and its fisheries.' The estimated population in the BOBLME-SA dependent on fisheries for livelihood and food security was about 20 million at the beginning of the decade of the 1990s (Hotta, 2000). This number would increase sharply today as greater clarity is provided to the many ways in which ‘dependency on fisheries’ should be defined in the context of the complexity of the fishery enterprise.

A parallel review is being conducted for the South East Asian countries of the BOBLME. Integration of the information among all countries constituting the entire BOBLME community will follow.

In this context of coastal resources, fisheries and livelihood it is necessary to start from an awareness of the position of perceptions of scientists on sustainability of fisheries, although ultimately the key decisions are made on political and trade priorities. Hilborn (2007) summarizes “There are two diverging views of the status and future of the world’s fisheries. One group represented largely by academic marine ecologists sees almost universal failure of fisheries management and calls for the use of marine protected areas as the central tool of a new approach to rebuilding the marine ecosystems of the world. The scientists working in fisheries agencies and many academic scientists see a more complex picture, with many failed fisheries but also numerous successes. This group
argues that we need to apply the lessons from the successful fisheries to stop the decline and rebuild those fisheries threatened by excess fishing. These lessons are stopping the competitive race to fish by appropriate incentives for fishing fleets and good governance. The major tool of resetting incentives is granting various forms of dedicated access, including community-based fishing rights, allocation to cooperatives, and individual fishing quotas. Many of the failed fisheries occur in jurisdictions where central governments are not functional, and local control of fisheries is an essential part of the solution”. This expert perception, based mainly on the experience of developed countries, acknowledges the need for collaboration between developing country governments and resource users. This situation is reviewed later in this section vis-à-vis Pitcher and Lam (2010), to convey the complexity of the task that lies ahead of BOBLME Project implementation.

1.1 Community-based integrated coastal management and specific objectives of this review

For the purpose of this review the BOBLME Project/FAO definition of community-based integrated coastal management (CB-ICM) is used. BOBLME defines CB-ICM in terms of three sets of activities:

1. community-based fisheries and habitat management;
2. co-management of fisheries and
3. the creation of alternative livelihoods among fisher communities in the region.

Some considerations pertaining to the conceptual basis of CB-ICM, as presently applied by FAO, particularly the role of the ‘state’ in the existing situation in the BOBLME-SA are presented in Section 3. In a simplified manner, the term “state” is used in the sense that includes government and associated entities including civil society, bureaucracy, private sector, religious organizations that are together recognized as forming a nation.

The objectives of the review, therefore, are:

1. To identify and evaluate the relevant sections of the large and diverse body of information and experience in Bangladesh, India, Maldives and Sri Lanka associated with:

   (i) community-based fisheries and habitat management (CB-FM) - this is where a community (a group of people) provides stewardship in the use of a fishery resource system including supporting ecological structures. CBFM is narrower in scope than co-management, because government here often plays a minor role (Berkes et al., 2001; IDRC, 2001);

   (ii) co-management of fisheries: a partnership arrangement in which government, the community of local fishery resource users, external agents (NGOs, researchers, academics), and other coastal resource stakeholders (boat owners, fish traders, tourism interests, etc.) share the responsibility and authority for decision-making (governance) in the management of a fishery (IDRC, 2001);

   (iii) the creation of alternative livelihoods among fisher communities in the region, i.e., activities designed to reduce the adverse impact of the harmful use of coastal resources and to provide income opportunities within and outside the sector that contribute to enhanced well-being, and in parallel reduce deprivation, resulting in the provision of conditions that enable people to acquire a quality of life in terms of valued activities and the capability to achieve these activities (Townsley, 2004; Sen, 1995; 1999; Jentoft et al, 2010).

2. To extract lessons from case studies of best practices that could guide the integration of fisheries co-management including the associated ecological system (CBICM) and sustainable livelihoods into the national development processes of governments, i.e., by mainstreaming fisheries co-management.
1.2 CBICM and Co-management Defined
The term 'community-based' in CB-ICM as defined above creates a contradiction in its practical implications. Co-management is used in this review in the sense in which it was discussed in 2005 at the APFIC Workshop on 'Mainstreaming Fisheries Co-management in Asia-Pacific' (APFIC, 2005; Brown, Staples and Funge-Smith, 2005). One of the four pillars considered essential for successful co-management is an enabling policy legislative environment (Brown, Staples and Funge-Smith, 2005). Only government can provide the required ‘legislative environment’ required in ICM where effective land use management is the key. Therefore, although the term CBICM is used in this review because it is required by the consultant’s Terms of Reference, the intended practical connotation does not imply that communities are in a position to ensure legal access and security of tenure. However, CBFM and co-management may be regarded as a mixture of community and government participation in varying degree along a continuum (Figure 1) (Brown, Staples and Funge-Smith, 2005).

Co-management describes the spectrum of shared management between the extremes of full community-based management (with full devolution of responsibility to communities/fishers) through to government-based management (with full responsibility controlled by government) (Figure 1). In this review, the terms 'community-based management’ and ‘government-based management’ refer to the two extreme ends of the spectrum. It is necessary to recognize that these extremes rarely exist in reality and that typically, there is some form of intermediate arrangement. Fishers and governments are not entities that can be linked directly because they are already embedded in complex socio-economic and socio-political systems. Therefore effective fishery co-management implies the formation of a mutually supportive network of relationships among fishers, government and associated stakeholders (Figure 2).

**Figure 1.** The relationship between co-management, community-based management and government-based management (Pomeroy and Williams, 1994. as adapted in Brown, Staples and Funge-Smith, 2005). The relationship between Community-based management and Government based management results in co-management of varying degrees. Mainstreaming establishes sets of collaborative partnerships between fisher communities and the relevant levels of government administration. These partnerships promote better governance based on shared decision-making. Traditional, artisanal and modernized small-scale fisheries that dominate the sector in the BOBLME-SA include diverse and complex forms of CBFM, co-management and alternative livelihoods development. Mainstreaming eliminates reliance upon ad-hoc projects and unsystematic interventions.
1.3 Methodology and Structure of the Review Report

The review was carried out in two stages:

Stage 1: Pre-workshop, in anticipation of the Regional Workshop held in Colombo, Sri Lanka, 28-29 July 2010; and

Stage 2: Post-workshop to give consideration to the recommendations in extracting best practices and lessons from case studies. The Workshop Report constitutes a companion document to this review. During preparation of the review effort was given to highlighting viewpoints of the government agencies, the NGOs, and civil society organizations, and, potentially, the private sector. It is the consultant’s experience that a mixture of perceptions and arguments from these four sides will contribute to a more balanced view of the broad-scale picture of fisheries and coastal livelihood within the context of irreversible globalization.

1.3.1 How to read this review.

The reader may proceed from the Overview to the Conclusions and Recommendations. Alternatively the reader may move from the Introduction to the Case Studies and proceed directly to the Conclusions and Recommendations. The section on ICM, Fisheries and Concepts provide perspective for the case studies and the conclusions. The form of concise presentation adopted in this review assumes some familiarity with the technical literature. Where necessary, some cited references may be accessed online. However, it may be necessary to obtain assistance from appropriate specialists in regard to conclusions and recommendations to understand legal implications.

The review report is presented in four parts:

Part 1: Provides background and introduction to the review; the methodology, summary of information from BOBLME Stage 1 National Reports and thematic Study Reports, and reflections on aspects of livelihood stemming from the literature since completion of BOBLME Stage 1 in 2004. Part 1 also introduces the attributes or elements of the Reference Model (RM) or framework for assessment of the case studies.
Part 2: Presents an analysis of selected best practice in community-based management and co-management case studies from the four countries using the Reference Model (RM).

Part 3: Presents aspects of complexity of the BOBLME-SA sub-region, the status of ICM, the trends in fisheries, the relevance of international discourse on fisheries and the relationship of future uncertainty.

Part 4: Provides the key lessons, conclusions, and recommendations from the review and considerations for implementation in the BOBLME Project.

1.4 Evolution of the BOBLME Programme – Stages 1 and 2

Beginning in 2009, the Bay of Bengal Large Marine Ecosystem #34 - BOBLME (Figure 1) Project has been implemented by the Food and Agricultural Organization of the United Nations, supported by the World Bank with a Global Environment Facility (GEF) Block B grant. The BOBLME includes Bangladesh, India, Indonesia, Malaysia, Myanmar, Sri Lanka and Thailand, to which Maldives has been added. This is an implementation stage following the preparatory stage completed in 2004.

The Preparatory Stage included a consensual process based on regional meetings and studies which resulted in a framework for the Implementation Stage. The long-term vision for this large marine ecosystem places the coastal fisher and linked populations as the stakeholders central to policy making and governance, i.e., ‘To improve the lives of the coastal populations of the eight participating countries through improved regional management of the Bay of Bengal environment and its fisheries.’ National reports were prepared for the four countries during the BOBLME Programme Stage 1 (Bangladesh: Hossain, 2004; India: Sampath, 2003; Maldives: Ali, 2004; and Sri Lanka: Joseph, 2004).

These reports

1. addressed the main threats to the structure and functioning of the biophysical systems and the associated fisheries in relation to the ecosystem approach to fisheries management – EAF (FAO, 2003) and

2. considered implications for trans-boundary problems and issues. Less attention was accorded to issues of livelihood associated with ICM and sustainable fisheries.

The National Reports were supported by theme reports on critical habitats (Angell, 2004), land-based sources of pollution (Kaly, 2004), shared and common stocks (Preston, 2004), legal and enforcement mechanisms (Edeson, 2004) and livelihoods (Townsley, 2004). The national reports and theme reports provided a partial foundation for this review. However, thinking on the status of CB-ICM, including small-scale fisheries and coastal livelihoods, had proceeded beyond the scope assigned to the national and theme reports since their completion in 2004. This review includes the major orientations that have occurred since 2004. However, summary background information from the Stage 1 reports and studies could, here, be useful to enable better understanding of relationships among coastal habitats, fisheries and livelihood.
Figure 3.A (Ai). The Bay of Bengal Large Marine Ecosystem #34 (BOBLME #34) extends from the sea around the Maldives to an extent beyond the Malacca Straits into the Gulf of Thailand (Aii). The fishery productivity of the BOBLME-SA is influenced by four seasonally reversing freshwater-influenced fronts (solid curved lines) which induces moderately high primary productivity (150-300 gC/m²-yr), and entrainment of small pelagic fish in the coastal waters. The Ganges-Brahmaputra Estuarine Front (GBEF) and the Myanmar Shelf Slope fronts (MSSF) are situated to the north, while the Palk Strait Front (PSF) and East Ceylon Fronts (ECF) are situated toward the southwest. Water depth in the central reaches of the BOBLME-SA beyond the continental shelf increases to several thousand meters. Nutrient upwellings are not reported for the BOBLME-SA although upwelling-like events are mentioned (Vinayachandran and Mathew, 2003; Mohan and Ali, 1995). A more informative profile of the BOBLME #34 is accessible at: http://www.lme.noaa.gov/LMEWeb/LME_Report/lme_34.pdf

Aik

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1.5 Coastal Geomorphological Diversity and Fisheries

It is important to recognize geomorphologic diversity and its significance for fishery productivity and coastal livelihood in the BOBLME-SA. The shorefront deltas, some with extensive mangroves, associated with the large rivers systems in Bangladesh (Ganges-Brahmaputra-Meghna rivers system) and along the east coast of India (including Ganges, Mahanadi, Godavari, Krishna, Kaveri) support significant small-scale fisheries and forestry-based livelihood activities. Some case studies in this review are from the tidal rivers and estuaries situated in these geomorphologic formations. Both in Bangladesh and in India some shorefront mangrove forests provide security to life and property (Hoanh et al, 2010). Coastal agriculture on these deltas is also highly significant in the regional economies. Mangroves on a similar scale, as geomorphologic entities, are absent in Sri Lanka and in the Maldives. In Sri Lanka, however, the geomorphological systems that support significant small-scale fisheries are the barrier-built estuaries. In these micro-tidal systems, the relatively minor extents of mangroves create problems for hydrology by accelerating sedimentation. These small mangrove extents do not provide protective barriers of any significance, although false generalizations so attest (Samarakoon, Epitawatte and Galapatti, 2008).

In regard to coral reefs, the situation in the Maldives is unique. Here the coral reefs constitute the dominant coastal ecosystem. Some coral reefs have been declared as marine protected areas because of their significance in fisheries and in tourism. Coral reefs occur in Mahatma Gandhi Marine National Park, in Andaman and Nicobar Islands. Bangladesh has coral reefs associated with a single offshore island, St. Martin’s Island. In Sri Lanka corals occur as relatively small fringing and patch reefs. These coral reefs are not a foundation of fish stocks as it is in the case of some fisheries in the Maldives (BOBP/REP/76, 1997a). Nevertheless, the fish resources associated with coral and seagrass habitats in the Gulf of Mannar support significant small-scale fisheries. The Indian segment of the Gulf of Mannar has been declared a Marine Bioshpere Reserve.

Angell (2004) concluded that mangroves (through habitat loss) and coral reefs (through habitat degradation) are the two main habitats facing major threats in the BOBLME region. It is doubtful if such a generalization is applicable uniformly to the BOBLME-SA. For instance, in the Maldives managed coral mining occurs because it provides necessary construction material. Concurrently measures are being implemented for protection and management of exceptional coral reefs for their values that combine tourism, fisheries and biodiversity. On the deltaic environments in Bangladesh
and in India, where mangroves also occur, efforts are underway to combine interventions toward food security from agriculture, aquaculture and biodiversity conservation, instead of only protecting mangroves.

1.6 Fishery Stocks, Statistics, Law Enforcement and Land-based Sources of Impacts

Fishery statistics in the BOBLME-SA are unreliable. The proportion of the catch to be identified at the individual species level has tended to decrease over time, while ‘unidentified fish’ account for an increasing share as fisheries diversify and large stocks are depleted. The general availability of statistics has not improved significantly over the past two decades, and statistics from artisanal and subsistence fisheries – which dominate in the BOBLME region – are a particular source of concern because of the lack of reliable data. As a result, although the available statistics probably do reflect general trends such as growth in production, annual figures and assessments involve considerable uncertainty, and changes from one year to the next may not be statistically meaningful (FAO 2002; Preston, 2004). Fishery development planning in the BOBLME-SA is thereby faced with data gaps for governance, thereby creating a gap between decisions and sustainable management (Hilborn, 2007).

The unreliability of available statistics is complicated by an official desire, within the relevant national bureaucracies, to show progressive increases in marine and freshwater fishery landings to satisfy political objectives of the governments (Sivasubramaniam, 2000). As a consequence a divergence may occur between planned production and the quantities actually achieved from year to year. The status of fishery production by the BOBLME-SA countries was estimated in 2002 to be in the region of 1.6 million metric tons (Table 1). The national reports indicate scope for substantial increases in production by expanding the operation of national fishing fleets into the exclusive economic zones (EEZs) and beyond. Nevertheless serious consideration must be given to whether or not the assumptions and expectations in the national reports are substantiated by reliable and verifiable data.

A study on legal and enforcement mechanisms in the BOBLME (Edeson, 2004) revealed that most laws, while adequate in terms of achieving certain limited objectives - such as controlling fishing within the EEZ, are non-existent when it comes to dealing with the high seas. There is a need to give effect to recent agreements, in particular, the 1995 UN Fish Stocks Agreement and FAO Compliance Agreement. More importantly, there is an absence of modern management concepts in the basic marine laws concerning the objectives of long term sustainable use, the precautionary approach and the need for ecosystem perspectives to underpin governmental actions in the marine sector. These should be introduced, possibly as clauses in key legislation stating the objectives of laws applying to the marine sector.

The coastal waters that are significant for fishery production in Bangladesh, India and in Sri Lanka are seriously affected by land-based sources of pollution (Kaly, 2004). As a consequence fishery management which seeks to address fishing effort and fishery livelihood cannot be effective without adequately addressing negative externalities from industry, agriculture and urbanization within the FAO EAF framework. This requires management of prioritized land uses within the framework of ICM. Edeson (2004) noted that most countries of the BOBLME region have laws which provide a basis for controlling land based pollution. However, enforcement is weak. In some instances, as in India and in Sri Lanka, the decentralization of regulatory powers to local government bodies complicates effective enforcement.
Table 1. Fishery production during 1999 – 2002 which reveals a disparity between FAO statistics (FAO, 2002) and the national reports (Preston, 2004). National fishery development plans are generally based upon the country statistics.

<table>
<thead>
<tr>
<th>Country</th>
<th>FAO data (tonnes)</th>
<th>BOBLME-SA National Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
<td>2000</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>137,345</td>
<td>162,037</td>
</tr>
<tr>
<td>India</td>
<td>716,753</td>
<td>781,223</td>
</tr>
<tr>
<td>Maldives</td>
<td>134,423</td>
<td>135,342</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>241,005</td>
<td>260,010</td>
</tr>
<tr>
<td>Total</td>
<td>1,229,526</td>
<td>1,338,612</td>
</tr>
</tbody>
</table>

1.7 The Nature of Coastal Fishing Communities and Small-Scale Fisheries

1.7.1 Demography & Socio-economic Conditions
Demographic trends in Bangladesh and in India reveal that population of small-scale coastal fishers is increasing but at a diminishing rate compared to previous decades (Tietze, Groenewold and Marcoux, 2000). Decreasing demographic trends are observed in the Maldives, as increasing numbers from outlying islands migrate to the capital Male, and the more developed and urbanized islands which have superior infrastructure. In Bangladesh, India and Sri Lanka, the decreasing trend is driven by poverty, urban migration, competition for shared coastal fish stocks and emigration for foreign employment mainly to the Gulf Countries, a situation shared by other developing countries in Asia and in Africa (Campbell, Whittingham and Townsley, 2006; Pramod, 2010).

BOBLME-SA has one of the largest concentrations of coastal poor (those living on less than US$ 2 per day). The number in the 1990s was in excess of 20 million (Hotta, 1996; Sivasubramaniam, 2000) (Table 2), of those whose livelihoods depend directly on traditional small scale fishing. The number of fishers involved in the coastal / marine fishery was estimated as 3.2 million at the beginning of the decade (Sivasubramaniam, 2000). Neither the actual numbers of small scale fishers are known with adequate certainty, nor their operational areas within boundaries of resource systems in which they operate. This population is distributed predominantly along the Bangladesh and Indian coastlines, and to a lesser extent along Sri Lanka’s coastal area. The Maldives is the exception since it has succeeded in eradicating poverty, only with some residual concerns for the wellbeing of residents of the most distant inhabited islands.
Table 2. The populations of small-scale fishermen directly involved in fishing in the nearshore coastal waters is reflected in the numbers of fishing craft. The trawlers and gillnetters, the modernized fishing craft, with significantly higher efficiency, which interact with the former contribute to the high rates of discards at sea and trash fish. An estimated three kg of trash fish / fish discards occur for each kilogram of shrimp captured for export (Pramod, 2010).

<table>
<thead>
<tr>
<th></th>
<th>Length of Coastline (km)</th>
<th>Area of Continental Shelf (km²)</th>
<th>Total fishing craft (2005)</th>
<th>Traditional / partially mechanized craft</th>
<th>Modernized craft (Trawlers / gillnetters etc.)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>India / Tamil Nadu</td>
<td>1076</td>
<td>41,000</td>
<td>54,420</td>
<td>47,760</td>
<td>7,617</td>
<td>Discards reported</td>
</tr>
<tr>
<td>India / Andhra Pradesh</td>
<td>974</td>
<td>33,000</td>
<td>41,039</td>
<td>38,449</td>
<td>1802 (trawlers)</td>
<td>--- do ---</td>
</tr>
<tr>
<td>India / Orissa</td>
<td>480</td>
<td>26,000</td>
<td>23,740</td>
<td>20,163</td>
<td>1340 (trawlers)</td>
<td>--- do ---</td>
</tr>
<tr>
<td>India / West Bengal</td>
<td>158</td>
<td>17,000</td>
<td>18,646 (?)</td>
<td>24,049</td>
<td>610</td>
<td>--- do --- Note disparity in numbers</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>About 700</td>
<td>66,400</td>
<td>&gt; 600,000</td>
<td>Over 90% of all craft</td>
<td>100 (2003)</td>
<td>Level of discards not known</td>
</tr>
</tbody>
</table>

The process of poverty eradication in the Maldives is driven by the distribution of benefits from combined economic growth in tourism and fisheries sectors (World Bank, 2010a). The population of Maldives, however, represents less than 2% of the total coastal population associated with small-scale fisheries in the BOBLME-SA. The need for improving coastal livelihood therefore is a problem mainly facing Bangladesh, India and Sri Lanka. The enhancement of livelihoods requires targeted interventions by the state based upon economic growth within the sector (Alam, 2005; DFID, 2005; Salagrama, 2005).

Mainstreaming of CB-FM and co-management must also give consideration to the differential impacts of overfished coastal resources on women, men and children. The women and children in coastal fishing communities in Bangladesh constitute more than 50% of the population owing to a combination of effects including migrations of male heads of households, abandonments, and various other poverty-related effects (Alam and Giassudin, 2005; Salagrama and Koriya, 2008). Some women face great hardship because of income poverty. Men who cannot any longer earn an income from fishing also face displacement and hardship. Migrations of men from fishing communities in Bangladesh and India sometimes occur to distant locations such as the Gulf Countries resulting in flows of remittances that benefit both national coffers and dependents (Bhattacharya, 2006). Whereas in Bangladesh and in India migration of women is restricted, in Sri Lanka, migration of women to these countries and their remittances contribute substantially to poverty reduction including in coastal communities (World Bank, 2008). Thus the influences and relationships that shape livelihoods in coastal communities are diverse and complex.

Within the BOBLME-SA sub-region, with the exception of the Maldives, income poverty ranging from about 40% in Sri Lanka to about 80% in Bangladesh and India, in the context of rising food prices (OECD/FAO, 2010; World Bank, 2011), is likely to be the most significant challenge for marginalized small-scale fisher livelihood (Table 3). Even in the absence of income poverty as in Maldives, indicators such as the percentage of underweight children (age to 5 years) associated with the Human Development Index (HDI), reveal the form of challenges faced. Despite several decades of
fisheries development through modernization that have produced rapid increases in fishery production in South Asia, many imbalances appear to exist within the sector in regard to the socio-economic consequences for the small scale fishery sub-sector. This raises a question that pertains to distribution of benefits of development.

Development of Fisheries and Unintended Consequences

Planned development of fisheries has been proceeding in the SA countries spanning a period of about six decades. During this period poverty reduction in terms of enhanced purchasing power in rural communities has been visible (Ferguson, 2005). Communications have improved providing access to expanding markets for rural agricultural produce. However, poverty reduction in rural fishing communities in Bangladesh and in India, to a lesser extent in Sri Lanka, has lagged behind positive change in the rural agricultural sector. It appears that planning and implementation on behalf of the artisanal coastal small-scale fishery, which provides livelihood to the vast majority in coastal communities, have resulted in diverse negative unintended consequences (APFIC, 2009).

Unintended consequences are outcomes that are not the results intended by a particular action. They may be positive or negative. The concept has long existed but was named and popularized in the 20th Century by the American sociologist, Robert K. Merton (Merton, 1996). The law of unintended consequences is an idiomatic warning that a careless intervention in a complex system always creates unanticipated and often undesirable outcomes. It is commonly used as a warning against the arrogant belief that humans can fully control the world around them.

Most fishery development interventions in South Asia occurred following independence under the rubric of ‘fishery modernization’ in the 1950s-1960s (India and Sri Lanka), and post 1970s in Bangladesh and the Maldives (see also Section 2.7.2). Modernization usually included motorization of new or traditional fishing craft to go further and stay longer at sea with little restrictions on where fishing was done. It was assumed that the traditional fishermen would be so impressed by the larger catches of the motorized boats that they would rush to motorize their own traditional craft or purchase modern boats. The planners appear not to have understood that the coastal fishery is highly complex with craft and gear adapted to site-specific topographies, target species and seasons. The traditional fishers generally had their own social and cultural practices and management systems for sharing resources in their complex local ecosystems (Kurien, 2003, 2005). The capacity of traditional fishers to make the transition was not given serious attention.

The unintended consequence of simple-minded planning that was not attuned to the prevailing complexity of fishery socio-ecological systems (see Section 3) was the marginalization of the traditional fishers who had little training and no capital to invest in modern boats and engines (Kurien, 2003, 2005; Salagrama and Koriya, 2008). The causes of unintended consequences stemming from planned social action were identified by Merton (1996), viz.

1. **Ignorance** (It is impossible to anticipate everything, thereby leading to incomplete analysis). Most planners did not understand the structure and functioning of coastal ecosystems nor the behavior of target fish species in relation to sea bed topography. They perceived the sea as a uniform resource waiting for more efficient harvesting by technologies (Pauly, 2006).

2. **Error** (Incorrect analysis of the problem or following habits that worked in the past but may not apply to the current situation). It was assumed that technologies that were effective on trawling grounds in the waters of developed countries would produce similar benefits in South Asia although the socio-cultural and socio-economic contexts differed (Kurien, 2003, 2005).

3. **Immediate interest (greed)**, which may override long-term interests. Trade in technologies as invest opportunities (inboard and outboard engines, trawlers, etc.) appears to have
motivated the development decisions both at the policy level and at the aid-provider levels (Samarakoon, 2007; Kurien, 2003, 2005).

4. **Basic values** may require or prohibit certain actions even if the long-term result might be unfavorable (these long-term consequences may eventually cause changes in basic values).

5. **Self-defeating prophecy** (Fear of some consequence drives people to find solutions before the problem occur, thus the non-occurrence of the problem is unanticipated.).

6. **Relevance paradox** where decision makers think they know their areas of ignorance about an issue, and go and obtain the necessary information to fill that ignorance, but neglect certain other areas of ignorance, because, due to not having the information, its relevance is not obvious.

In much of planning in the modernization of fisheries the causes of unanticipated consequences are evident through complex pathways. While the possibility of impact of modernization through unanticipated consequences was inadequately understood in relation to fishermen, the implications for women in fisher households were altogether ignored. While it is true that women rarely went out to sea in fishing craft, it is incorrect to ignore their significance in other roles. In particular the role and contributions of women in the supply chain as processors and retail sellers are rarely appreciated.

**Women & Livelihoods**

Khatun (2004) describes the differential consequences for women and households from the impositions of conditions flowing from the liberalization of shrimp exports from Bangladesh, and access to markets in the European Union (EU). These include:

- disruption of families;
- change in the household economy; and
- increased living expenses.

As a remedy, Khatun (2004) observes that mainstreaming of the livelihood concerns of fishermen and women fish workers should be reflected in the poverty reduction strategy paper (PRSP) of the country. A balanced strategy has to incorporate the issue of food security and equal opportunities for all the participants of the sector. Especially, poor fishermen and the marginalised women who have been the losers of the EU ban should be provided with credit for developing alternative sources of income.

The observation of Khatun (2004) highlights the tendency to inadequately address the problems and issues of women in small-scale fishing communities. Women living and working in traditional fishing communities have historically played a very significant role in the development of the fishing industry as well as in the sustenance of coastal communities, families and their livelihoods. Much of the work that women have done in the past, and continue to do, is not visible, nor is it regarded as valuable. Society tends to assume that the term ‘fisher’ refers to a fisherman, and women’s role and their contribution to the fisheries is seldom recognized. This is a situation that requires carefully planned intervention to ensure equitable distribution of benefits including women.
Table 3. Some development indicators for the four countries in the BOBLME-SA which shows the significant change that has occurred from 1993 to 2007. The increase in per capita GDP, the improvement in the HDI rank in Maldives reflect the virtual elimination of poverty.

<table>
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<tbody>
<tr>
<td>Sri Lanka</td>
<td>0.663</td>
<td>0.759</td>
<td>29</td>
<td>470</td>
<td>4,243</td>
<td>118 / 102</td>
<td>14.0 / 39.7</td>
</tr>
<tr>
<td>Maldives</td>
<td>0.497</td>
<td>0.771</td>
<td>30</td>
<td>450</td>
<td>5.196</td>
<td>119 / 95</td>
<td>Nil / Nil</td>
</tr>
<tr>
<td>India</td>
<td>0.309</td>
<td>0.612</td>
<td>46</td>
<td>360</td>
<td>2,753</td>
<td>133 / 134</td>
<td>41.6 / 75.6</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>0.189</td>
<td>0.543</td>
<td>48</td>
<td>210</td>
<td>1,241</td>
<td>145 / 146</td>
<td>49.6 / 81.3</td>
</tr>
</tbody>
</table>


1.7.2 Lack of Information Available on Contribution of Small-scale Fisheries
While there is often very little precise information on the real contribution of small scale fisheries to livelihoods and economies in developing countries, and although many small-scale fishing communities are poor and vulnerable, it is now widely acknowledged that small-scale fisheries can generate significant profits, prove resilient to shocks and crises, and make meaningful contributions to poverty alleviation and food security, in particular for:

- those involved directly with fishing (fishers, and fishworkers in both pre- and post harvest activities);
- the dependents of those involved directly with fishing (fishing-related households and communities);
- those who buy fish for human consumption (consumers);
- those who benefit from related income and employment through multiplier effects;
- national societies in general and those who benefit indirectly as a result of national export revenues from fisheries, re-distributive taxation and other macro-level mechanisms (Bene, McFadyen and Allison (2007).

1.7.3 Developing Coastal Livelihoods – a key challenge
The key challenge underlying the problems and issues in small-scale fisheries in the BOBLME-SA is livelihood. National plans for fishery development and modernization since the 1950s in the BOBLME-SA countries uniformly proceeded from a policy of improving the well-being of traditional fishers whose lives were regarded as being in danger because their traditional crafts were inadequate (Raghavan, 1961; Government of Ceylon, 1951; Kurien, 2003, 2005; Islam, 2004). Nevertheless, the literature reveals that poverty and vulnerability of an expanding coastal fishing population, with the exception of the Maldives, have increased instead of decreasing despite modernization (Salagrama and Koriya, 2008). Unfortunately, the commitments made by the governments in the BOBLME-SA, except the Maldives, have not been able to make adequate progress in their commitment to reducing poverty by 50% by 2015 (MDG Monitor http://www.mdgmonitor.org/).

The study of coastal and marine livelihoods in the BOBLME during Stage 1 (Townsley, 2004) defines livelihood as:

‘A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover
from stresses and shocks and maintain its capabilities and assets both now and in the future, while not undermining the natural resources base’ (Carney, 1988).

Understanding livelihoods starts from differentiation of basics that include whether people are men or women, how gender influences their capacities and roles in society, their age, ethnicity, caste, and social class that define their relationships within society and the manner in which these relationships influence their well-being. Some of these attributes may be controlled by people in creating well-being for themselves, while other aspects are directly and indirectly controlled by the state and wider society. Together these complex relationships determine the manner in which people can benefit from five classes of assets (human, social, physical, financial and political) in their relationship with the natural productivity of coastal ecosystems. Those aspects that people cannot change including societal institutions as well as natural events, such as coastal hazards, define their vulnerability context (Townsley, 2004).

1.8 The Context for the BOBLME Project – Implementation Phase 2

BOBLME Programme Stage 2, in its strategic approach, seeks to improve the lives of coastal populations through improved management of the environment and fisheries. A growing body of research (e.g. McClanahan et al., 2009) is now beginning to demonstrate that in a strategic approach, people and their livelihood must take precedence in order to facilitate improved environmental management as the long term outcome. The vast majority of coastal people in the BOBLME-SA have lives and livelihood embedded in small-scale fisheries. Sustainable management of small-scale fisheries means management of the people involved in exploiting the fishery rather than the exploited fish stocks themselves (IDRC, 2001; APFIC, 2005). This simply means effective management of the traditional and small-scale fishers operating in coastal waters. These are people whose lives and livelihoods have changed little for many generations since the national fishery development processes have benefited them mainly by default (Brown, Staples and Funge-Smith, 2005).

Development of the fishery sector in the BOBLME-SA, since the 1960s, has relied upon modernization of craft, gear and infrastructure. This has resulted in significant increases in production both for domestic consumption and for export. However, populations in all the countries have more than doubled during the same period with proportionate increases in coastal populations and the demand for fishery resources. Because of growing pressure on the coastal environment the attention of planners is now being directed both at integrated coastal management (ICM) and fisher livelihoods (Ali, 2004; Hossain, 2004; Joseph, 2004; Sampath, 2003). In view of the magnitude and diversity of coastal livelihoods involved and their political implications, the national governments are reluctant to implement policies that include environmental safeguards if they entail a heavy social cost. In this context, CB-ICM supported by co-management and mainstreaming acquire significance. Co-management and mainstreaming, however, have legal implications.

Jentoft et al. (2009) argue that the future of effective co-management and the participation of governments in maintaining legal order will depend on how ‘legal pluralism’ is dealt with. Legal pluralism arises when different legal ideas, principles and systems are applied to the same situation (Vanderlinden, 1989; Jentoft et al., 2009). Fisheries is one sector where, in many countries, the state has abstained from exercising authority and where no or limited fisheries legislation exists. In some instances, this is a deliberate choice based on the observation that local legal systems seem to work sufficiently well. In other instances, the state is lagging behind and has not been able to respond to new situations and needs, such as the current environmental crisis in fisheries. This is a situation that is evident in India and in South Asia in general (Jentoft et al., 2009). The case studies presented in Section 2 reveal more explicitly the existence of many informal and formal legal systems in the BOBLME-SA. On top of this existing complexity at local and national levels, additional legal requirements may arise in future from considerations pertaining to the 'global crisis' in marine fisheries and the role of the World Trade Organization (WTO).
The global outlook mainly encourages fundamental reforms in the sector based upon management of fishing effort in harmony with the supporting ecosystems aimed at stabilization and/or restoration of stocks to optimize economic gains (World Bank/FAO, 2009), and drastically curtailing the impact of industrial fishing in this process (Clover, 2004; Chuenpagdee et al., 2006). In both these perceptions, persuasive arguments are provided for economic growth and/or gains, and for safeguarding the livelihoods of the millions of small-scale fishers. Navigating through these perceptions and arguments requires a meaningful guiding framework which is provided by FAO’s Vision for Small-scale Fisheries (Box 1). The Reference Model, used in this review, is developed from a foundation composed partially of the scientific literature that has emerged after completion of BOBLME Stage 1. The complexity of viewpoints provides little scope for generalization that applies to BOBLME-SA requirements. Pitcher and Lam (2010) provide a comprehensive assessment of the scientific fishery management solutions that have emerged in a millennial perspective (see Section 3).

A careful weighing of the status of national fisheries in the BOBLME-SA, the assessment of the state of global fisheries both in terms of economics and fishery science, the vision of the FAO for small-scale fisheries (Box 1) places this review at a crossroad (Figure 4). National perceptions expect expansion of fishing effort to more effectively benefit from resources in the EEZs, a share of which is now being taken by illegal, unreported and unregulated (IUU) fishing (Berkes et al., 2006; Flothmann et al., 2010; MRAG & University of British Columbia, 2008; Gianni and Simpson, 2005). The global perceptions indicate restraint and improved governance to sustain optimal benefits from the existing level of fishery production (e.g. World Bank/FAO, 2009). The steps taken by Bangladesh, India and Sri Lanka, perhaps with the exception of the Maldives, toward benefitting from the fishery resources in the EEZs may largely determine if mistakes made in other regions of the world, such as resorting to unregulated industrial fishing (Berkes, 2003; 2006; Clover, 2004; Gianni and Simpson, 2005) would be repeated in the BOBLME-SA. Jacquet and Pauly (2008) assert that ending industrial fishing is needed for imparting sustainability to the marine fishery as a whole. Hilborn, 2007 adopts an approach which seeks to engage in adaptive learning to benefit from lessons in sustainable fishery management.

Box 1. FAO’s Vision for Small-scale Fisheries

The vision for small-scale fisheries is one in which the contribution of the fisher community and other stakeholders to sustainable development is fully realized. It is a vision where:

- they are not marginalized and their contribution to national economies and food security is recognized, valued and enhanced;
- fishers, fish workers and other stakeholders have the ability to participate in decision-making, are empowered to do so, and have increased capability and human capacity, thereby achieving dignity and respect; and
- poverty and food insecurity do not persist; and where the social, economic and ecological systems are managed in an integrated and sustainable manner, thereby reducing conflict.

The vision for small-scale fisheries is couched in human and development terms. The means to address the vision therefore lie strongly in the:

- strengthening of the profile of the sub-sector and protection of the current assets of small-scale fisheries,
- establishing their appropriate placement vis-à-vis fisheries as a whole, and
- establishing small-scale fisheries within other sectoral and development contexts.

Fulfillment of the vision requires that policy and socio-economic criteria governing small-scale fisheries, fishers and other stakeholders be established and met. Improved resource and environmental management are implicit in the proper and effective functioning of small-scale fisheries (Staples et al., 2004).
1.9 CBICM – A sub-component of the BOBLME Programme Implementation Stage

The BOBLME Programme Stage 2 is aimed at improving the lives of coastal populations and health of fishery stocks they depend on for livelihood. The complete BOBLME programme is made up of the following components:

1. The development of a Strategic Action Plan (SAP) to protect the health of the ecosystem and manage the living resources on a sustainable basis to improve the food and livelihood security of the region's coastal population etc.;

2. The improvement of Coastal/Marine Natural Resources Management and Sustainable Use, including: promoting community-based management; Improving policy harmonization; devising regional fishery assessments and management plans for hiilsa, Indian mackerel and sharks; and demonstrating collaborative critical habitat management in selected areas;

3. The development of better understanding of the BOBLME Environment etc.;

4. The maintenance of ecosystem health and management of pollution etc.; and

5. Project management, including: developing a monitoring and evaluation system for the project etc.

This review is undertaken as a foundation activity for component 2.1 a core part of the implementation process.

1.10 Ecosystem Approach to Fishery Management (EAF)

The BOBLME Project aims to demonstrate the ecosystem-based process while progressing with CBICM. The components of the project therefore fit into the framework of the ‘ecosystem approach to fishery management (EAF) (FAO, 2003). The EAF addresses social, environmental and governance goals, and is an integrated approach that promotes sustainable development that strikes a balance between human well-being and ecological well-being. The EAF includes all important aspects of an ecosystem and different activities that impact on it (BOBLME, 2009):

- People/communities;
- Habitats (marine and coastal);
- Fisheries resources (both target spp. and associated species);
- Vulnerable plants and animals (biodiversity);
- Impacts of fisheries harvesting and other human activities (pollution, degradation of habitats etc.)
The BOBLME-SA Programme has arrived at a crossroad where the choices by national planners in regard to moving forward in the marine fishery sector to acquire optimal benefit from global trade could determine the long term health of coastal and marine ecosystems, and sustainability of livelihoods of coastal small-scale fishers who constitute a majority of participants in the sector’s labor force.

The components constituting the EAF contribute toward making the BOBLME (Stage 2) implementation a process that addresses a complex system with nested sub-systems (Holling, 1973; Ostrom, 1990; Ostrom et al., 1999; Ostrom et al., 2007; Serrat, 2009). The focus here has to be on multiple relationships instead of linear cause-effect relations. Also, both continuous natural change in ecosystems, and the potential for human use of the productivity of component sub-systems are inherent attributes of a complex system such as an LME. ‘Diversity of human perceptions and the rules under which groups of people behave’ is the aspect that is not stated explicitly in the approach to dealing with a complex system. This diversity of expectations, problems, issues and solutions and the division of power associated with them will ultimately define concrete action and who benefits from them and, importantly, who loses (Pauly, 2006).

1.11 Marine Fisheries: the attributes of successful management – Components of the Reference Model (RM)

The examples of CB-FM, co-management and alternative livelihood selected for analysis in this review would acquire value if they can be placed in a broader framework that would enable meaningful generalizations for successful fishery management within FAO’s Vision for Small-scale Fisheries (Box 1). Such a framework is provided by the outcome of two international meetings convened by FAO to explore the relationships pertaining to unsustainable fishing and over-exploitation (Greboval, 2002; Swan and Greboval, 2003). The factors of unsustainability and overexploitation of fisheries, and implementation instruments that could contribute toward sustainability provide the appropriate framework (Hilborn, 2007), viz.:
Good governance: Many of the world's fisheries are managed in a non-sustainable manner because real governance is absent. The appropriate governance system requires the consensus of too many, or the system is corrupted by bribery. Successful fisheries management systems enjoy governance that is deemed transparent by the participants with a scale of decision-making appropriate to the fisheries being managed and in which the regulated stakeholders feel represented in the process.

Appropriate incentives: Fishermen respond to the incentives of the system; in open access, or "Olympic" systems, the race to fish demands more and bigger vessels and pressures management agencies for larger catches. In dedicated access fisheries, fishermen cannot catch more fish with more or bigger boats, and so the incentives favor reducing costs, higher quality product, and better information to improve management of the fishery. The simple method used in Pacific Islands is tenure – a right of ownership (Johannes, 1981). Hilborn (2007) regards it as probably the most valuable fisheries management measure ever devised. Quite simply, the right to fish in an area is controlled and no outsiders are allowed to fish without permission.

Reducing demand for limited resources: Quite often, there is a mismatch between fishing capacity, demand, and the productive capacity of the resource. Successful fisheries have found ways to better match the demand to the productive capacity of the resource, using removal of subsidies and appropriate incentives as tools. Unfortunately, reducing demand for resources almost always results in lower employment and thus conflicts with governmental fisheries policy.

Elimination of poverty and providing alternatives: In many regions of the world, fishing is one of the few forms of employment open to the very poor. Pauly (2006) called this problem Malthusian over-fishing. As populations grow and the agricultural resources per capita decline, the pressure on marine resources increases. Although it is difficult and complex, elimination of poverty is an important step to sustainable fisheries, and it is no coincidence that many of the world's well managed fisheries are found in countries with little poverty and many alternative forms of employment.

Improving knowledge of complex ecosystems: Some of the non-sustainable fisheries can be attributed to poorly understood, complex ecosystems, whereas most well-managed fisheries are characterized by well-funded data collection programs to provide information on the resource being managed.

Interactions of the fisheries sector with other sectors and environments: Fisheries management agencies are usually only one player in a potential success story, and their well-intentioned efforts are often subverted by other government agencies through subsidies or poor environmental regulations that badly affect fish or fish habitat, especially in fisheries that strongly depend on critical coastal habitat.

Tools of sustainable management: A set of recommended tools and approaches that are supported broadly within the fisheries community emerged from the FAO workshops. In order of importance, given by FAO, these are:

1. Rights: The granting of secure rights to resource users (individually or collectively) for use of a portion of the catch, space, or other relevant aspects of the fishery.
2. Transparent, participatory management: The granting of a meaningful role to stakeholders in the full range of management (e.g., planning, science, legislation, implementation).
3. Support to science, planning, and enforcement: Providing the resources necessary for all aspects of management of the fishery.
4. Benefit distribution: Using economic tools to distribute benefits from the fishery to address community and economic sustainability.
5. **Integrated policy**: Planning fisheries, including setting explicit objectives that address all the dimensions of sustainability and the interactions among the factors of unsustainability.

6. **Precautionary approach**: Application according to FAO guidance.

7. **Capacity building and public awareness raising**: Development and application of programs to better inform policy makers and the public at large about main fisheries issues.

8. **Market incentives**: Using market tools in situations in which they are appropriate for addressing factors of unsustainability.

### 1.12 Mainstreaming Co-management

Achieving sustainable fisheries, as the above findings demonstrate, depends upon integration of coastal resources and fisheries management within national development processes, not depending on ad hoc projects i.e. mainstreaming (Figure 1). Mainstreaming establishes sets of collaborative partnerships between fisher communities and the relevant levels of government administration. These partnerships promote better governance based on shared decision-making. Traditional, artisanal and modernized small-scale fisheries that dominate the sector in the BOBLME-SA include diverse and complex forms of CB-FM, co-management and alternative livelihoods development. Mainstreaming eliminates reliance upon ad-hoc projects and unsystematic interventions.

Brown, Staples and Funge-Smith (2005) analyze lessons learnt from many studies to show that the problems faced by those implementing co-management programmes are usually variants of the ‘generic’ problems that face all types of common property resource management, although manifestations of these are often very specific to cultural and socio-economic contexts in particular cases (Stern et al., 2002). These issues and lessons learnt can be categorized under four main pillars for the successful co-management of fisheries:

1. An enabling policy and legal framework;
2. The participation and empowerment of communities (and other users);
3. Effective linkages and institutions; and
4. Resources – a resource worth managing and the people and money to do it.

The recent decision made at the UN-FAO Committee on Fisheries (COFI) at its 29th Sessions in February 2011 in regard to an international instrument in support of small-scale fisheries in developing countries has the potential to contribute toward significant improvements in small scale fisheries in relation to food security and livelihoods.

### 1.13 Impetus to Improvement of Governance of Small-scale Fisheries: The UN-FAO Committee on Fisheries (COFI) Resolution on Small-scale Fisheries in Developing Countries

Much of the material in the present review for BOBLME-SA resonates with the results of deliberations at COFI 29th Session held in February 2011.

As the outcome of discussions at the 29th Session of COFI, agreement was reached on the introduction of an international instrument in recognition of the importance of this sector for food security and poverty reduction. Challenges faced by small-scale fisheries including lack of infrastructure and vulnerability to natural disasters were highlighted during discussions. Other relevant matters discussed included:

- the need for caution against creating trade barriers for small-scale fishers in the international instrument,
- providing buffer systems and creating models for market development,
• the need for integrating subsistence fisheries in national economic development plans,
• the importance of market access,
• the need for local-scale action, including on: empowering small-scale fishers in local economic decision-making processes; community-based management; micro-finance and credit for small-scale fisheries; and technology transfer to this sub-sector,
• the cultural importance of small-scale fisheries to communities,
• achieving appropriate balance between artisanal and small-scale fishing boats,
• the need for caution against “blurring the borders between small-scale and industrial fisheries”,
• linking global assistance programmes to good governance, application of ecosystem approaches to fisheries management, and disaster risk management and climate change adaptation.
• Integration of internationally shared stocks into national and international management systems and policies,
• recognition of the much lower environmental impact than other types of fishing,
• the need for technical support to prevent over-exploitation and provision of economic alternatives to ensure sustainability
• supporting control, surveillance and data collection,
• improving institutions; educating fishers, especially women,
• improving vessels and providing better conditions for landing of fish.

A number of intergovernmental organizations, including the Bay of Bengal Programme highlighted their work relating to small-scale fisheries, with some supporting the creation of a sub-committee and inclusion of governance and labor issues in an international instrument. The International Collective in Support for Fishworkers urged COFI to agree on a negotiated international instrument to complement FAO’s Code of Conduct for Responsible Fisheries (CCRF).

The Secretariat summarized the discussions noting, inter alia: the recognition of the importance of small-scale fisheries and the need for integrating them in national policies; the heterogeneity of the small-scale fisheries sector; the role of South-South cooperation; and the need for FAO to cooperate with other organizations on these issues. On the international instrument, consensus was noted on the voluntary nature and the need to focus on developing countries, and guidelines as the preferred option for such an instrument. www.iisd.ca/vol29/enb2905e.html.
2. Case Studies to Illustrate Community-based Integrated Coastal Management: Best Practices and Lessons and Aspects of Livelihood

The Introduction concluded with FAO’s findings related to the factors leading to the lack of sustainability and overexploitation of fisheries, the tools for sustainable management, the requirements for mainstreaming, and the recent decision at the 29th Sessions of COFI (Greboval, 2002; Swan and Greboval, 2003; Hilborn, 2007; APFIC, 2005; Brown, Staples and Funge-Smith, 2005). Mainstreaming establishes sets of collaborative partnerships between fisher communities and the relevant levels of government administration. These partnerships promote better governance based on shared decision-making. Traditional, artisanal and modernized small-scale fisheries that dominate the sector in the BOBLME-SA include diverse and complex forms of CB-FM, co-management and alternative livelihoods development. Mainstreaming eliminates reliance upon ad-hoc projects and unsystematic interventions.

Best practice and lessons have been extracted and generalized from the complex and diverse examples of CB-FM, co-management and alternative livelihoods development. The Reference Model in Table 4 is a simplified analytical framework derived from the information presented in the FAO’s findings (Greboval, 2002; Swan and Greboval, 2003).

The objectives of this section are:

1. To present a selection of case study examples that illustrate best practice in CB-FM, co-management, and alternative livelihood development from the different ecological, geographic and socio-political contexts found in the BOBLME-SA sub-region.

2. Promote adoption of best practices in community based management and co-management. To assess the enabling factors that are needed to strengthen and replicate recognized best practice. To understand the requirements for mainstreaming best practices in a manner that governments may support with policy, legislation and funds for comprehensive and inclusive CB- and co-management.

The selection of case studies presented in the review is not exhaustive. The case studies were selected to provide a representative set of examples of lessons and best practices and to facilitate further thinking about small-scale fisheries and coastal resource management in the BOBLME-SA sub-region. Other examples of Community-based management and Co-management may exist that can be assessed using the same Reference Model. Analysis of further case studies will enrich the lessons that emerge. Despite the fact that each case study is a unique entity it is necessary to identify commonalities and draw generalizations between them in order to draw out lessons and best practices.

2.1 Case Study Briefs

This section presents a selected set of case study briefs that demonstrate elements of best practice in CB-Coastal Resource management/ Fisheries Management and Co-management. Each case study represents a complex socio-ecological system (Ostrom, 2007a, b). The mix of case studies reveals in sequence aspects of complexity and uncertainty, the unintended consequences of fishery cooperatives, the existence of TURF systems on a range of geographic scales, highly sophisticated institutions for co-management and CB-FM for common property resource systems, effective community-based governance that applies to vast extents of coastal seas, the need for co-management in the face of persistent use conflict, and finally community-based management practices still awaiting discovery and description. The sample of case studies also shows the need for concerted exploration and research.
Some examples have particular geographical settings and can be characterized by four sets of information that explain the interacting ecological and social processes both at the site specific level and at the national policy level. These four sets of information provide identity to the management processes that would enable tracking of change over time. Where information is lacking effective management is difficult.

Each social-ecological system, regardless of scale, is composed of four main interacting ecological and social processes (Ostrom, 2007a, b). The four main interacting ecological and social processes are:

1. the resource system which portrays the ecological relationships in particular geographic settings – the ecosystem linkages;
2. the number of resource units generated by the resource system such as the quantity of fish which then can be valued,
3. the number of resource users involved which provides the scale of livelihoods that require management, and
4. institutional / governance system in operation which would include information pertaining to mechanisms that exist for conflict resolution and maintaining the integrity of the resource base.

The notation assigned to each case study (CS 1 – 17) is used in the summary table for classification into good and improvable practices.


This case study demonstrates an intervention by the national government which has implications for mainstreaming co-management of coastal resources. An FAO/UNDP project implemented over a period of five years from 2002-2006 sought specifically to weave co-management of fisheries into a comprehensive development approach. Results of post-project evaluations, although not presently available, could reveal sustainability.

It is only when human well-being has improved sufficiently that any progress toward improved ecological well-being can be tackled. Through the formation of village organizations (both women’s and men’s organizations), the project assisted in improving basic cleanliness, provision of multipurpose village resource centre cum school buildings, salary of teachers, training of health focal points, training of village-based natural resource conservation/management activists, training in safety at sea and the initiation of savings. Most of these provisions have been made on matching support basis. Subsequently, it was possible to form a network of village organizations at sub-district and district levels. It was through these organizations that decisions to increase mesh size and to remove destructive gears such as shrimp fry catching nets was possible. The communities also built up enough confidence and capability to interact better with both local and central government. A key to this success was the grassroots level involvement of local fishery officers from the Department of Fisheries as well as project staff (Brown, Staples and Funge-Smith, 2005).

Resource System:

Coastal marine waters accessed by fishing craft as well as shallow estuarine waters suited for collection of shrimp post-larvae. The latter activity (prohibited by law) is discouraged as income from alternative project activities compensate. Maps are not available for understanding ecosystem linkages.
Resource Units Generated:

Information not available to enable an economic value to be assigned to project outputs.

Number of Resource Users:

Fishing communities of 117 coastal villages are organized into 248 village level organizations (123 men and 125 women covering about 20,000 households). Village organizations connected and linked through the network of Upazila and District level federations. Realizing the benefit of organization, 8 new villages have come forward to join the project. Steps have been taken for registration of COs.

Governance System:

Village Organizations were formed, one for men and another for women. They have been trained for participation in planning and implementation of project activities in all components of the decision-making hierarchy. Increased savings and ownership of assets by women have contributed to their self-confidence and willingness to participate in decision-making forums. Mechanisms for accountability and for securing democratic decision-making are unclear.

The possible contribution from the intervention described above, spanning about five years, needs to be studied and compared also with the achievements of CODEC (Community Development Center) which has been working with marginalized coastal communities in the same geographic setting for the past two decades (Sengupta and Giassudin, 2006).


This case study demonstrates the futility of seeking to enforce laws based solely on technical considerations. The social costs of law enforcement are intolerable in a political context.

Resource System:

The lower estuarine waters of Pasur River in southwest Bangladesh indicates that on average 40% of total annual income of the poorest coastal fishers comes from postlarvae fishing during the few months involved. However, indiscriminate fishing of wild postlarvae, with high levels of by-catch, has an impact on biodiversity in coastal ecosystems. This has provoked imposition of restrictions on postlarvae collection. The ban has, however, not been firmly enforced because of the lack of alternative livelihoods for coastal poor (Ahmed et al., 2010). The prevailing situation demonstrates the manner in which innocent people are made ‘virtual’ criminals by unenforceable laws. In 2000, the Government of Bangladesh imposed regulation to stop shrimp seed collection to protect the fisheries resources. But thousands of people involved in post larvae collection are defying the ban. There is an apprehension that strict implementation of the banning ordinance may displace the people who depend upon the income from catching the larvae (Azad, Lin and Jensen, 2007). Maps of the geographic locations are not available for understanding ecosystem linkages.

The resource units generated by the system:

It has been estimated that approximately 2 billion shrimp fry are collected annually from wild sources. The output from shrimp postlarvae collection collectors in 2000/2001 was 2,500 metric tons with a value of 1,377 million taka, shared by 185,000 collectors. The earnings per day in 2001/2002 were 25 taka, converting to about US$ 0.5 (Flewelling and Hosch, 2003a).

Resource Users:

The 185,000 resource users recorded in 2000/2001 more than doubled to 420,000 by 2006. The vast majority of the people involved, including a majority of women, and school-age children, are from poor households in the vicinity of estuaries and the coastline. Their fishing devices are simple drag
nets pulled in waist-deep water even during the winter season. A minority among them operate bag nets from boats.

Governance and interactions:

Research shows that poverty, migration, credit systems and lack of coordination of service-providing agencies all have important influence on shrimp fry collection in the coastal zone. With an ever-increasing demand for sustainable use of coastal fisheries resources there is a need for consensus among the stakeholders. Alternative employment opportunities for fry collectors, community participation and an integrated coastal zone management approach are proposed for the development of fisheries resources where the poor become participants in decision making.

This case study demonstrates the inability of co-management interventions to make positive contributions to social wellbeing when governance is flawed and decisions are imposed on fishing communities. Compare with the positive Japanese experience of fishery cooperatives in co-management (Box 2).

Resource system:

The entirety of the coastal and marine fishery in diverse geographic settings that may be amenable to introduction of modern technologies, as well as poverty reduction interventions.

Number of resource units generated: In excess of 589,000 metric tons in 2000/2001 (Flewelling and Hosch, 2003a).

Number of resource users:

In excess of 352,369 including (185,000 shrimp post-larvae collectors) in 2000/2001 (Flewelling and Hosch, 2003a).

Governance:

A comprehensive range of laws exist for fisheries management but enforcement is weak. Participatory approaches to decision-making are absent. The voluntarism that generally imparts sustainability to cooperatives is missing.

The Directorate of Cooperatives of the Ministry of Local Government, Rural Development and Cooperatives is responsible for the organization of fishermen into cooperatives and the registration of cooperative societies. Fishermen cooperatives have been organized into the traditional three-tier pyramidal structure: primary, intermediary and apex societies. The national apex organization is the Bangladesh Jatiya Matshyjibi Samabaya Samity (BJMSS). There are 88 intermediary and 4,243 primary societies with a membership of 540,000 as of 1983. It provides direct supervision to the apex cooperative society which is authorized to introduce innovations in the fishing field: crafts, gears, ice plants, cold storage units, etc. The fishery cooperatives subscribe to fisheries development objectives which include:

- improving traditional and employment-oriented technologies,
- organizing and mobilizing the rural labor force,
- improving the socio-economic conditions of fishermen and fish farmers,
- increasing fish production, raising the consumption of fish and the level of nutrition,
- development of selected fishery products.

The major function of the apex society is the execution of the supply and service programme. BJMSS imports fishing materials for their members. These imports are exempt from all taxes and dues.
the period 1972-77, it imported nylon rope, marine diesel engines, floats, etc., with a total value of Taka 50 million (US $ 2 million). Presently the major activities concern the establishment of fishery infrastructure, coastal fishing with mechanized and non-mechanized boats, marketing, two ice plants (each 33t capacity), processing (dressing, packaging, and freezing) and export of processed fish, shrimp and frog legs. The major sources of finance for BJMSS consist of share capital and savings. It has the exclusive right to obtain loans from the Government or from the Bangladesh Bank on a 100% guarantee by the Government.

Foreign aid plays a very important role in the development effort. A number of national and regional projects are being executed by the FAO (Food and Agriculture Organization of the United Nations). Among the bilateral aid programmes, the Danish assistance, most of which is directed through the Bangladesh Fisheries Development Corporation (BFDC), constitutes the largest component in marine fisheries. In the estuarine and coastal regions, fish is landed and distributed through municipal and private markets and wholesale fish market and fish landing terminals of BFDC situated at Chittagong (fish harbor), Cox’s Bazaar and Khulna. To improve marketing of the catches from the estuarine and coastal areas, BFDC has recently established wholesale fish markets and fish landing terminals, one each at Khepupara and Patherghata. The most highly priced fish is silver pomfret followed by bhekti, hilsa and the Indian threadfin. Next in the category of valued fishes are the black pomfret, croakers and catfish. In the estuarine and coastal regions fishermen sell their catch to the fish traders (‘mohajon’) through agents (‘dalals’). These dalals act as brokers between the traders and the fishermen in the negotiation of prices. Fishermen are often obliged to sell their catch at a low pre-determined price to the fish traders or money lenders to whom they are socially and financially indebted. Fishermen sell their fish either by count or by weight.

Marketing charges in BFDC wholesale fish market are six per cent of the sale proceeds. In private, municipal and cooperative wholesale fish markets, arathdars/mohajons conduct the auction on a commission basis ranging from three to six per cent of the proceeds.

Bilateral aid and trade interests appear to be interlinked and diverse (BOBP, 1985). The major imports of equipment since 1972 consist of trawlers (from USSR, UK, Japan, South Korea, Denmark), marine engines (from USSR, Denmark, Japan, Sweden, Germany), synthetic twine and ropes (from South Korea, Denmark, Japan, Norway), boatbuilding timber (from India, Burma), refrigeration equipment (from USSR, Japan, Denmark), ice plants (from Denmark, Japan, India, Norway, Rumania), plants for making fishmeal and shark liver oil (from Denmark), two fully equipped fishing research vessels (from Japan, Denmark), refrigerated and insulated lorries (from Rumania, Japan, Korea) and training equipment for trawling (from USSR).

Resource users:

Traditionally, marine fishing was practiced at subsistence level by the Jaladas of the Hindu communities. They have been operating and living in isolated villages along the coast. Within the fishing communities, there are two distinct groups: those who own boats and fishing gear and those who work only as fishing crew. Most fishermen are landless, and are, therefore, employed only during the fishing season since other employment possibilities are almost nonexistent. A few revert to estuarine fishing when the marine fishing season is over. A majority of the fishermen thus rely on moneylenders during off-fishing season to meet their subsistence needs. This has invariably led most fishermen to be chronically indebted, mostly to fish traders.

With the increasing commercialization of marine fisheries, and the rise in landlessness due to population pressure on limited agricultural lands, a large number of Muslims began taking up fisheries as a full-time job. Most of the motorized small-scale fishing boat owners now are Muslims and they hire Hindu or Muslim fishermen as crews on a share of catch basis (and in a few cases on wage basis). The most common practice is for a boat and gear owner to pay an agreed percentage of the value of each catch after covering operating costs (i.e. the cost of fuel, ice and food for crew). The
sharing arrangement varies from area to area, on the type of fishery and between periods in a fishing season. Around Chittagong and Cox's Bazaar, the most common practice is for the boat and gear owner to take 60% of the value of each catch after covering operating costs, and for the crew to share the remaining 40%. The entitlement of each crew member varies depending on the type of function he performs.

Fishing is traditionally a low-status occupation and the majority of the fishing families belong to socially neglected classes. Only 14% of the total fishing population may be considered as literate; no more than one per cent have secondary or higher education. The low literacy and marginal economic position of fisherfolk make them highly dependent on middlemen. Most are either indebted to fish merchants or local contractors to whom they are bound to sell their catch below the market rates. They borrow money drawing on future catches, in order to equip themselves with craft and gear for the coming fishing season or just to maintain their family. In the absence of mutual organization, they have little scope to liberate themselves from a continuing cycle of indebtedness. Living conditions of fisherfolk, particularly in the slums of urban areas, leave much to be desired. These areas are characterized by congestion, sub-standard housing and inadequate municipal facilities such as water, refuse disposal and sanitation. In the rural areas housing and basic infrastructure are equally inadequate.

Box 2. Fishery management in Japan as a model that demonstrates CBFM and co-management (Uchida and Makino, 2008; Brown, Staples and Funge-Smith, 2005)

The evolution of management of the coastal fishery in Japan demonstrates the practical value of co-management as the foundation of sustainability (Uchida, 2008). In terms of employment, 94.7 percent of active fishers (defined as a fishery business owner, often a vessel owner, engaged in fisheries for more than 30 days in a calendar year), are involved in coastal fisheries. Historically, conservation of marine resources in Japan has been administered under rules that fishermen imposed on themselves (Makino and Matsuda, 2005). Individual fishing villages established their own rules regarding the use of coastal resources in their area.

Fishery cooperative associations and territorial use rights for fishing

Japanese coastal fisheries are governed by fishery cooperative associations (FCAs). The associations’ jurisdictional boundaries are defined geo-politically, rather than biologically on the characteristics of the targeted species. FCAs play one unique role—they manage fishing rights. Fishing rights are analogous to territorial use rights for fishing -TURFs (Christy, 1982), which are granted by the government and protected by law.

Evolution of Co-management

i. Coastal waters were defined in Japan as public areas by legal codes dating back as far as the year 701 AD. The idea of “fishing rights” in ancient Japan was nonexistent.

ii. During the feudal era in the seventeenth century, the rule changed such that only residents of coastal villages that did not have enough arable land on which to grow rice were permitted to fish. Such villages were given a certain area of coastal waters for exclusive use and harvester guilds were formed in the villages to protect the resource from outside poachers.

iii. In the late 1870s, the new Meiji government attempted to convert the fishery management system to a top-down style with fee-based licensing. Nationwide opposition eventually forced the government to reverse the process.

iv. Governance regressed back toward self-governance by local resource users. In 1901, enactment of the Fishery Cooperative Law legally recognized these ad hoc user rights. Fisher guilds evolved into FCAs.

Fishery management organizations – Co-management Institution

Co-management of coastal fisheries is carried out by fishery management organizations (FMOs). An FMO is a group of fishers who share the same fishing ground and/or operate in the same fishery and are collectively
engaged in resource and/or harvest management according to mutually agreed rules.

**Self-regulation**

An FMO typically adopts combinations of management measures. Some FMOs simply set limits to fishing effort (such as days-at-sea or vessel size), while others adopt sophisticated fishing effort coordination measures as if the group is behaving as a sole resource owner.

New entries to the fisheries are typically tightly controlled. First, most coastal waters are included in TURFs belonging to FCAs and hence it is illegal to fish commercially within these waters. Among the legal fishers, entries to specific fisheries are often restricted by the license system administered by either the local or central government. More and more FMOs are getting involved in market coordination activities. FMOs that are actively engaged in marketing activities tend to earn higher revenue per member.

Since the mid-1980s the workforce in extreme poverty involved in the coastal fishery had expanded to more than 4.2 million in 2006 (Nesar et al, 2010). This segment of the population is among the most exposed to climate change implications.

**CS4 India, Andhra Pradesh: The Andhra Pradesh Fishermen Cooperative Societies Federation (AFCOF)**

This narrative is based on: A Review of Fisheries Development Schemes in Three Fishing Villages in Visakhapatnam District, Andhra Pradesh (Salagrama (2003a).

This case study demonstrates the inability of potential co-management interventions to make positive contributions to social wellbeing when governance is flawed and decisions are imposed on fishing communities. Compare with the positive Japanese experience of fishery cooperatives in co-management (Box 2). Similar examples exist for the other states along India's BOB coastline.

The information provided below is for the entire Indian coast of the Bay of Bengal since the cooperative structure is intended to benefit all the states.

**Resource system:**

The entirety of the coastal and marine fishery amenable to introduction of modern technologies within a range of 12 kilometers to sea.

**Number of resource units generated:**

In excess of 173,254 metric tons in 2000/2001 from the coastal commercial fishery. (Flewelling and Hosch, 2003b). The quantity is not reported from the coastal artisanal fishery which employs fivefold more fishers (Flewelling and Hosch, 2003b).

**Number of resource users:** In excess of 860,660 (Flewelling and Hosch, 2003b).

**Governance:**

A comprehensive range of laws exist for fisheries management but enforcement is weak. Participatory approaches to decision-making by the central and state governments are vague or absent. However, the decision-making processes at the local level (panchayats) are adequately strong to maintain territorial use rights in fisheries (TURFS).

The Andhra Pradesh State Fishermen Cooperative Societies Federation Ltd. (AFCOF) is the apex fisheries cooperative society in the state. It provides loans in kind - i.e., as fishing tools and equipment, which it routes through the primary cooperative societies. The Federation is funded by the National Cooperatives’ Development Corporation (NCDC), and is administered by the
Department of Fisheries, Government of Andhra Pradesh. The main findings of the review of performance of AFCOF are given below. The objectives of AFCOF have been cited as:

To improve the livelihoods of the fishing communities by providing in-kind loans – i.e. fishing tools and equipment,

Routing the benefits through the primary cooperative societies in the state, so as to enable strong and sustainable grassroots level structures to come up in the fishing communities.

Asset generation for improving livelihoods: AFCOF’s emphasis on improving livelihoods focused strongly on the principle of enhancing the physical assets – boats and fishing gears – aimed at maximising the returns from exploitation of the natural assets. Unfortunately, there was little or no support to harnessing traditional knowledge and skills, or to enhance people’s ability to diversify. The result has been that when the technology proved to be too efficient and ended up overexploiting the natural resources, limited recourse was available to the fishers to diversify at short notice. Besides its negative impacts upon the natural resources and the sustainability of operations, technology-led development had another shortcoming. Access to new technology was dictated by the entrepreneurship of the potential users, and for established technologies, there were issues such as political and bureaucratic patronage, ability to invest sizeable sums and social standing in the community etc that played a determining role. In most cases, the real poor benefited only from the trickle-down effects. By making equity secondary to growth, the schemes might not have contributed as much as they could have to the livelihoods of the poor.

Besides, the provision of hardware support – as assets – was not backed up by developing suitable systems of organisation, discipline, knowledge and awareness – the ‘software’. From the perspective of the Federation, as well as the fishers, it was all rather cut-and-dry – one gives, while the other takes. Unfortunately, the integrated context in which the social, economic, technical, biological and environmental issues form a part of daily existence of the fishing communities was not considered. Obviously, things are more complicated than that, particularly when it is remembered that the beneficiaries were a largely illiterate group of people. Ultimately, the years of hard work and huge amounts of money spent appear to have achieved much less than can be reasonably hoped.

Representativeness of the Societies: On hindsight, the expectation that the Societies would act as a link between the communities and the Federation in a just and transparent manner was rather exaggerated. The leaders of the Societies often came from the socially influential, politically active and economically powerful sections of the communities, and it would be optimistic to the point of being naïve to believe that they allowed genuinely democratic decision-making processes to take root in the Societies. Obviously, some of these leaders strove to maintain the social cohesion of the village, ensured equality of opportunities wherever they could, and represented the majority viewpoint when it came to dealing with the outsiders, but this was seldom a democratic process. For the members to open their mouths against any of the leaders’ dealings would mean inviting their full wrath, which manifested in many ways. Thus, all dealings between AFCOF and the actual beneficiaries have come to be carried out by the ‘Society’, meaning the leaders of the Society.

Sustainability of the Societies’ operations: A key point about the Cooperative Societies, which emerges from interactions with the members, is that the formation of a Society is invariably linked in people’s minds to receiving government support. Cooperative societies are regarded entirely as channels for receiving government funds. Unfortunately, this is a view that had been fostered and actively encouraged in several instances by the government agencies themselves. Two Societies began to receive loans right from the year of their inception indicates that they had hardly any time to become consolidated as an organisational entity. As it stood, the process of formation of a Society was not very rigorous, the delays in giving recognition to the Society being mainly administrative than a conscious way of fostering strong organisation at the grassroots level. The Department of
Fisheries’ recognition automatically allowed the Society to receive a host of benefits, which were mostly credit-linked.

**Accountability of the Societies:** The self-assured manner in which the new Societies went about distributing what was obviously AFCOF’s money makes one suspect that at least some of them came into existence motivated more by the money that forming a Society brought in, rather than in a real spirit of cooperation. Because Societies with such motives played so central a role in the process, the systems of developing schemes, identifying beneficiaries, generating awareness about the programmes, service delivery mechanisms, quality of inputs provided, post-delivery services, credit delivery and recovery mechanisms, monitoring the performance of inputs and necessary backup services have all been affected adversely. People simply took whatever they are given because they are sure they will never have to, or be made to, pay.

**Summary:** From the available information, one can only conclude that issues such as institutional strengthening, true cooperative and participatory modes of functioning, decentralisation of decision-making, sustainability of institutions and activities, and establishing proper systems of accountability have not received as much attention from AFCOF as they needed. Rather, a highly idealised picture of the structure (egalitarian) and functioning (democratic, transparent and accountable) of the Societies was allowed to dominate the perceptions of the people, in spite of repeated evidence to the contrary. The result has been that most activities have come to a standstill, yielding few – if any – positive benefits to the fishers. The cooperative movement appears to have come to a halt in the fishing villages. AFCOF now finds itself in the red. There is a need for urgent measures to improve the conditions at the beneficiary level, at the Society level and at the AFCOF level.

**CS5. Sri Lanka: evolution of fishery cooperatives – political imperatives versus fishery development.**

*(Joseph, B.L. personal communication and draft paper for the upcoming publication on the history of Sri Lanka’s fishery).*

Resource system: The entirety of the coastal and marine fishery in diverse geographic settings that may be amenable to introduction of modern technologies.

Number of resource units generated: The artisanal small-scale fishery produced 145,382 metric tons (Flewelling and Hosch, 2003c).

Number of resource users: 105,027 in 2000/2001 (Flewelling and Hosch, 2003c).

Governance: A comprehensive range of laws exist for fisheries management but enforcement is weak. Participatory approaches to decision-making are vague or absent. Most decisions are driven by political priorities (Joseph pers. comm.)

The first attempts at organizing fishery co-operatives under colonial rule, preceded independence in 1948, as a means of:

- uplifting the socio economic conditions of the fishermen,
- providing credit to enable them to purchase their craft and other needed inputs, and
- assisting them in marketing their production.

These co-operative societies, hurriedly organized by the Department of Fisheries, were not based on genuine, co-operative principles. They were established for channeling of loans to agents of fish merchants to increase fish supply to meet wartime shortage. The loans and advances enabled agents to purchasing fish directly from the fishermen for distribution in Colombo. Following independence, the Department of Fisheries re-organized co-operative societies to assist the small scale fishermen to market their catches. Two types of co-operative societies resulted: (i) Co-operative Credit and Sales Societies - these were limited mainly to those types of fisheries where the working unit was small
such as outrigger canoes, log rafts, and (ii) Co-operative Fishing Societies - these were meant for fisheries with large working units, such as beach seines, which collectively owned the nets. In both types of societies the catch was sold jointly through the society and proceeds were shared among the parties concerned according to prevailing custom.

Between 1952-1958, supported by a Canadian Programme, the necessary training in co-operative principles and operations were provided to the prospective members prior to beginning a society. By 1956, there were as many as 181 village level co-operative study circles with a membership of around 3,000 established under the project. In 1956 there were a total of 93 societies with a membership of 3,681. This represented 4.6 % of a population of 76,000 engaged in fishing. These societies together had some share capital and physical assets, less than initially anticipated. The reasons for relative failure were:

1. Inadequate knowledge of fishing rights and customs on the part of organizers of the society which leads to insufficient output or frequent fishing disputes.
2. Capital shortage for repairs and replacement at the end of an unsuccessful season.
3. Insufficiency of catches in a particular operational area.
4. The inadequacy of technical expertise within a group of fishermen who form the society.
5. Inefficiency of a cooperative society of fishermen, with a feeling of equality among them, being not as successful as a hierarchical organization in the private sector.

A new policy on fisheries cooperatives was formulated in 1959 under which, government appointed Fishery Inspectors were required to organize and to register cooperative societies. A large number of societies were registered almost overnight for issuing mechanized boats. This caused widespread disillusionment in the numerous cooperative study circle groups which were previously organized and trained under the Canadian Cooperative Training Programme. They could not acquire registration. This was a great blow to the building of a genuine co-operative movement in the fisheries sector. The government was compelled to reverse its policy, and loans were once again extended to non-members of cooperative societies. Many co-operative societies became bankrupt and ceased to function during the transition. However most 'new societies' which consisted of a membership that benefited from the initial training survived because they were committed to self improvement.

In 1968, following recommendations of a Royal Commission (Laidlow Commission), inactive societies were liquidated, small village level societies were amalgamated gradually into a smaller number of viable primary societies, and a regional union was established for the southern coast. The Ceylon Cooperative Federation then followed, and the fisheries credit schemes were revised to fall in line with the rules applicable in agricultural and industrial sectors.

By 1972, the government again decided to go back to the policy of providing the co-operatives with the monopoly of issuing loans to the fishermen. This brought in its wake another fundamental reorganization of fisheries co-operative societies. It resulted in the formation of 45 large primary societies by hastily re-combining the existing 292 village level societies which existed at the time. This reorganization contravened the recommendations of the Royal Commission, and predictably failed. The fishermen resisted the reorganization and in the course of events most of these societies came to be badly mismanaged. A committee of office bearers where the majority were government appointees could not win the trust of fishermen. The repayment on loans diminished, staff was in excess of the actual needs, and most societies showed operating losses. Irregular business practices and financial mismanagement eventually resulted in massive repayment default. Some improvement in repayment in respect of inboard motorized craft (3.5 ton boats) occurred only after the ownership of boats was transferred from the society to the actual skippers.

The Fishery Master Plan 1979-83 departed from the earlier government policies with regard to cooperative organizations to meet the new challenges presented by the liberalized economic policies
implemented after 1977. Policy orientation was stated as: "The role of fishery cooperatives as producers in their own right have been modified. Cooperatively owned boats have been less productive than privately owned boats; consequently, the cooperatively owned boats will be transferred to private ownership when loans from the government have been repaid. Greater emphasis will be placed on assisting individual fishermen to undertake the direct purchase of new vessels and fishing gear". Despite these statements there was no major overhaul of the co-operative societies. Only politically motivated tampering occurred.

A policy based on the pledge given by the government party in the 1977 election to "set up organizations of the poor fishermen and fisher women" came into operation. It envisaged the active involvement of co-operatives in the industry areas ranging from fish production, supply of fishing inputs, settlement of fishing disputes, facilitating insurance and pension scheme work, channeling of state assistance to fishing communities, marketing and distribution of fish, management of fisheries service centers, fishing community centers, services and facilities at harbors and anchorages. Thus a fresh wave of cooperative societies came into being in the immediate aftermath of the Parliamentary Election of 1988 at four levels: village, local government, district and national levels. The National Fishery Development Plan 1990-1994 went to the extent of setting out the formation of Village Level cooperative societies as one of the main targets to be achieved for implementation of the Plan. The target set for this five year period was 850 societies with a membership of 850,000 and a substantial total capital reserve through the savings of its members. Active fishers constitute about 10% of the membership. Various changes continue to occur in the fishery cooperatives mainly based upon the requirements of the minister in charge of the subject.

Conclusion: From the governments perspective cooperatives have the potential to be a mechanism for linking with the people. Successive governments have used this mechanism for taking its programmes to the people. Successes are seen in the case of the consumer cooperative movement in the context of grave shortages, controls and rationing. However, in the absence of such conditions cooperatives have failed miserably and this is no more amply demonstrated than by the history of fisheries cooperatives in Sri Lanka. The initiative to form these organizations never came from the people but was foisted on them. Thus they were never genuine people’s organizations. Generally co-operatives became victims of the whims and fancies as well as the political doctrines of the governing political parties. Following economic liberalization subsidies and state assistance decreased to a trickle. Fishery cooperatives have failed to contribute to the development of the fishing communities as initially intended.

CS6. Maldives: Territorial use rights in fisheries (TURF) for Maldivian Nationals in the Coastal Fishing Zone
(Source: BOBP-IGO, 2009)

This case study demonstrates the existence of fishery co-management in an area (about 500,000 km²) defined for territorial use rights in fisheries (TURF) which is about half the extent of the Maldives EEZ. Hilborn (2007) asserts TURFs as the simplest and most effective approach that contributes to sustainable fishery management worldwide. The extent of this TURF is about the size of the Indian EEZ along the BOB coastline, or the entirety of Sri Lanka’s EEZ, or threefold larger than the entire EEZ of Bangladesh.

Resource system:

The oceanic waters bounded by 75 nautical miles from the atolls (see Section 3). The main classes of fish harvested are tunas and sharks.

Number of resource units generated: 140,851 metric tons (Adam, 2004).
Number of resource users: In excess of 15,390 (Adam, 2004).

Governance: A comprehensive range of laws exist for fisheries management but enforcement requires strengthening. All decisions are made in consultation with respective leaders / representatives of atolls and islands.

The dominant component of the Maldivian fishery occurs in the Coastal Fishing Zone (CFZ) which provides territorial use rights in fisheries (TURF) for Maldivian nationals. Intruders are taken into custody by the Maldivian Coast Guard supported by monitoring information provided by the Maldivian fishers. Overall fishery production from the Coastal Fishing Zone has been increasing.

Although the fishing industry is the sixth highest employer at the national level, it remains the third major economic activity in the atolls, providing livelihoods for the majority of the atoll population. Next to tourism, it employs the second highest number of males (19% of employed males). The fishing industry in the country operates as a small-scale (informal) enterprise. A majority of the fishers (88%) have no fixed location of work as they operate from fishing vessels out at sea. Over a third of the fishers (36%) operate as group workers, around one fourth as own-account workers and contributing family workers. Only 16 percent of the fishermen work as employees. Other primary industries: agriculture and sand mining also have similar attributes in terms of the informal nature of operation.

The increasing fishing power and efficiency of fishing vessels has resulted in increased catches of both skipjack and yellow fin tuna. Skipjack unit yield has increased almost consistently in recent years; from about 270 kg/ day in 1997 to over 600 kg/ day during 2006. Yellow fin tuna yield has been also being increasing from 50 kg/ day in 2000 to over 100 kg/day in 2006. Apart from this, a foreign licensed longline fleet operates in the EEZ of the Maldives (75 miles and beyond). About 40 vessels are licensed to operate in the EEZ, although the numbers that actually operated in recent years may be lower.

Almost the entire catch comes from within a radius of 75 miles of the islands, an area reserved for the local fishers. The extent of the EEZ situated beyond the CFZ contributes only 2 percent of the catch (2007), which largely comprises yellow fin tuna. In terms of fishing methods, pole & line accounts for 88 percent of the landings, followed by hand line and trolling. Pole and line fishing vessels operate mainly around the fish aggregating devices (FADs) fixed at about 12 miles from the atoll rims. Depth at these locations varies from 2 000 to 3 000 meters. Occasionally, the pole and line tuna fishermen also fish the free-swimming tuna schools. In terms of fishing vessels, mechanized Masdhonis accounted for about 97 percent of the landings in 2007. The relevant legal enactment describes the conditions for licensing of foreign vessels or joint ventures in the EEZ, provides for apprehension of vessels, arrest and penalties, and describes the Coastal Fishery Zone (CFZ).

CS7. Maldives: Exclusive use rights of ‘house reefs’ assigned to populations of inhabited islands.
This case study demonstrates the manner in which cascades of TURFs under CBFM, can exist as nested, coupled and hydrologically interconnected operational entities within the vast ocean space of an EEZ (BOBP, 1997a).

Resource system: The coral reefs associated with inhabited and uninhabited islands, and island chains.

Number of resource units generated: Information required for each ‘house reef system’.

Number of resource users: The fisher population of the island to which the ‘house reef’ belongs. The size of these populations are not reported in relation to islands and particular house reefs associated with them.

Governance: Decisions are made by the Island Chief in consultation with elders.
The coral reefs surrounding every inhabited island (200 inhabited islands) are nested within the Maldives CFZ. Fishing at these reefs, termed ‘house reefs’ is the exclusive right of inhabitants of the islands under the supervision of the Island Chief. Thus, about 200 TURFs operating under informal convention also exist as nested and coupled entities within the CFZ.

This case study demonstrates the manner in which five essential attributes for sustainable common pool resources management when combined with formal legal support operates as a co-management entity with almost no transaction cost to the government. However, because of its geomorphologic attributes the system can be undermined by rent dissipation (Samarakoon, 2007).

Resource system: The semi-enclosed tidal channels that connect the Negombo Lagoon (a barrier-built estuary) to the sea. Mainly a *penaeid* shrimp fishery where juveniles are captured during migration to the sea. Fishing occurs at designated stations of appropriate depth. Adversely affected by numerous negative externalities of land uses.

Number of resource units generated: Information required.

Number of resource users: About 285 members of respective fishery societies (CEA / Euroconsult, 1994; personal communication Sebastian Fernando).

Governance: All decisions are based on democratic principles in keeping with a code of conduct guided by a set of rules. Declared by the Government of Sri Lanka as a legal entity with exclusive use rights.

The estuarine stake net fishery in Negombo Lagoon dates back several centuries (Amarasinghe et al., 1997). It embodies all the attributes required for sustainable common pool resources management by way of formalized co-management (CEA/Euroconsult, 1994). This system is briefly described prior to comparison with the ‘padu’ fixed net fishery in Cochin, India (Berkes, 2006). The five necessary and essential attributes (Ostrom, 1990) are:

- **Democracy**: A general meeting of the entire membership is held annually, under the chairmanship of a senior Roman Catholic priest, without fail, and an effective democratic system of election of office bearers for a fixed term of one year is held by a secret ballot. The system operates in a set of communities that are entirely Roman Catholic, but belonging to different occupational castes. A spiritual aura permeates every aspect of management including imposition of penalties, usually by a parish priest.

- **Rules and Enforced Penalties**: An operational code of conduct exists spelling out penalties for infringements. All penalties have been enforced without fail.

- **Equitable Benefit Sharing**: The mechanisms for equitable sharing of benefits is the allocation of rotating stake net stations by a blind draw of lots (lottery) the *padu*.

- **Limitation of Access**: Access to membership is limited by hereditary rights and strict conditions for new entrants where the society decides on admission of new members for various pre-determined reasons.

- **Free-rider Elimination**: Conventional safeguards against free-riders have protected the integrity of the system although persistent efforts are made by both hostile interests and by proxies of political interest who seek to cash in on the shrimp fishery.

Despite the superlative institutional arrangements, the fishery is gradually attenuating because of the loss of stake net fixing stations. The primary cause of loss of net fixing stations is sedimentation and infilling driven by both natural processes and by land capture for illegal housing. In addition to
physical shrinkage of the water body, negative externalities of watershed land use include industrial pollution from the discharge of untreated wastes. Sediment entrapment as an unintended consequences of mangrove planting, as a conservation measure, increases the infilling rate (CEA / Euroconsult, 1994; IUCN, 2009). Thus unintended consequences arise from:

- non-fishery related land uses that are eroding the resource rent from the fishery, and
- conservation related land uses driven by fallacies such as argument by 'false analogy' in relation to mangrove planting which have accelerated sedimentation processes.

The adaptive evolution of fishing systems based upon sharing of resources has been demonstrated in many other location in BOBLME-SA including Cochin, Kerala, Andhra Pradesh, Pulicat Lake among others that have an appropriate geomorphology. Three community-based fisher associations, i.e., sanghams, in the Cochin Estuary of Kerala, South India that use the padu system were investigated by Berkes (2006). The sanghams administered the rotational allocation of shrimp fishing spots, fished with stake nets that are rows of bag-like nets fixed to stakes driven into the ground. They operated under a set of well-defined rules serving livelihood, equity of access, and conflict resolution needs among their members.

As a commons institution, the padu system of the Cochin estuary only dates back from the late 1970s (Lobe and Berkes, 2004). Tracing their origins showed that they arose out of two events. The first was the globalization of shrimp markets. Shrimp became "pink gold," as many small-scale fishers in South India abandoned other resources in pursuit of shrimp (Kurien, 1992). The second factor was the centralization of fisheries management in Kerala. In 1967, the Kerala Fisheries Department started to institute a new licensing arrangement, replacing an older system of land and fishing site holdings. Beginning in 1974, state legislation required licenses for all fishers, but the state lacked the means to enforce the new law. Because shrimp fishing was lucrative and attracted new entrants, the resource effectively became open access, forcing the fishers to self-organize to consolidate what they considered to be their rights in a large and crowded estuary and lagoon system (Lobe and Berkes, 2004).

Figure 5. Cross-scale governance in lagoon shrimp management cases in Sri Lanka and Kerala, India. Note the absence of arrows in the Kerala case.

Each padu association in the Cochin estuary dealt with the exclusion issue by limiting the access of non-members, and the ‘subtractability’ issue through rules that provide for equity, social responsibility, and conflict management among its members. However, the Kerala State government does not recognize the three associations in the study area, nor does it license the fishers. They continue to fish only because of a 1978 court order establishing them “as fishers by profession”
(Lobe and Berkes, 2004), and ongoing state-level political action by their Dheevara caste organization to protect their rights (K. T. Thomson, personal communication reported in Lobe and Berkes, 2004).

Berkes (2006), in his conclusion, comments that the challenge of plurality is pervasive, and resources are contested by multiple actors in each case. Kerala is the most crowded and contentious case, and it is possible that the lack of institutional solutions is related to the pessimism of the actors that win-win solutions are possible. Commons theory holds that solving the ‘subtractability’ problem depends, among others, on the users having workable relations for monitoring, sanctioning, and conflict resolution (Ostrom, 1990).

The India case also illustrates some of the challenges related to scale in a community-based system that appear to have emerged as a response to certain external drivers. Southern India is home to a number of traditional community institutions for coastal resource management. What have been called padu systems are found in Sri Lanka and the southern Indian states of Kerala and Tamil Nadu. These are lagoon and estuarine resource management systems, mainly for shrimp fisheries, characterized by the use of rotational fishing spots allocated by lottery. They are species- and gear specific, with rules to define fishing sites and rights holders, often according to social or caste groups (Lobe and Berkes, 2004). Some padu systems in Sri Lanka go back to at least to the 18th and possibly the 15th centuries (Amarasinghe et al., 1997).

The sanghams seem to be effective in dealing with the ‘subtractability’ problem; they have well-defined and clear rules to regulate resource use among members. However, regarding the exclusion problem they are only partially effective. They control the stake nets that are in their rows of nets and have a say about who fishes them, including those that are leased out, but they have no control over the other fishers in the area. The three sanghams control only about one-half of the 289 stake nets owned locally, and that in turn is only a small fraction of some 13,000 stake nets used in the entire lagoon and estuary system. In the heavily used estuary and lagoon system in Cochin, there appears to be no systematic data collection or stock assessment, but there is some enforcement of restrictive regulations. The lack of state recognition and mechanisms for cross-level coordination has limited the ability of the three sanghams in the Cochin estuary to contribute to management at the regional level. However, there is no effective regional-level management.

Given the lack of resources in most developing countries, is it realistic to expect the management of such resources as used by padu systems of South Asia? There are, in fact, well-functioning padu systems with both local- and regional-level management, and they are found in the well-studied Negombo Lagoon of western Sri Lanka (Amarasinghe et al., 1997; Amarasinghe et al. 2002). Figure 5 sketches the differences between these two lagoon management cases that use variations of the same padu system. Both are species and gear specific, with rules defining sites and rights holders, and both use a lottery-based, rotational use system for fishing sites. The differences are organizational.

Both cases grapple with the tendency to define issues at only one scale. In Kerala, and Sri Lanka, the local level is the focus of management. The other levels are present in Kerala but not effectively engaged as also observed in some other countries, except in the Sri Lanka case. The Kerala case is unusual in that it lacks even an attempt at forging vertical institutional linkages. However, the scale issue transcends institutions and links the Sri Lanka case trajectory to changes occurring at the level of the barrier built ecosystem and its hydrology (IUCN, 2009). In this sense, FAO’s EAF (FAO, 2003) becomes a significant step in the direction of incorporating the physics and chemistry of coastal water bodies into the community based and co-management frameworks.
This case study illustrates the convergence of fishing technology and management practices based on the similarity in geomorphologic settings. The resource system is relatively concentrated and definable within a spatial boundary. This facilitates the exercise of TURFs.

**Resource system:** Godavari backwaters – tidal channels in the shorefront delta.

Number of resource units generated: Information required.

Number of resource users: Information required.

Governance: Community level governance through membership in panchayats, access restricted by territorial use rights regulated by the community. No record of legal status provided by the government.

Boddu-Chinna-Venkataya-Palem (BCV Palem), is a location where fishing activities are carried out by a number of fishing systems confined to the creeks and the backwaters, the traditional systems of management and control related to fisheries and fishing are elaborate and have an important economic function (see Case Study of Stake Net Fishery in Sri Lanka). Fishing in creeks in backwaters has a firm relationship with geomorphology and space restriction for operation of the fishing devices. Access rights are controlled by way of membership of the panchayat (also see CS10).

**CS10. India, Andhra Pradesh: Shore Seine and Backwater Fisheries - Small Scale Fisheries - Dealing With Complexity and Change – A Comparison** (Salagrama 2003b)

The state has a coastline of 900 km with an estimated 870,000 fishers living mainly in fishing communities. Wide differences exist among these communities in regard to fishing systems, disposal, marketing, social, and political organization. Traditional fishery management systems have evolved in relation to the geomorphology and ecology of the bio-physical system. Geomorphologic drivers of two villages, Uppada and Boddu-Chinna-Venkataya-Palem (BCV-Palem), illustrate the effectiveness of traditional CB-FM systems in the regulation of fishing practices. The specifics vary between the two systems.

**Resource system:** Coastal stretches.

Number of resource units: Information required.

Number of resource users: Information required.

Governance: Information required.

In Uppada, where there is often considerable competition for space for beach seine operations which often require large groups of people, there is a greater emphasis on social issues and relationships. The community-based nature of fishing occupations in Uppada seems to be a reason for the inclusive nature of its membership. Shore seines, boat launching and lifting, are all more or less dependent on the involvement of a large number of people in the activity. The predominance of small pelagic fish species in the catches means that during certain parts of the year, the entire community has to work as one unit to be able to dispose of the fish properly.

In BCV Palem, fishing pressure in the shallow creek waters was higher within a defined boundary, conflicts more likely, the existence of use rights that are shared equally amongst the members has meant that there are more incentives to keep people out than in. So why have traditional community-based management systems (TCBMS) survived in Andhra Pradesh and why have they been so successful at managing fishing activity? Firstly, they are directly connected to the specific conditions of natural and social environment in the area and so are flexible enough to cope with...
change and locally relevant so as to engender support. Panchayats are holistic and cross-sectoral. They develop systems that emphasize secure, sustainable and equitable access to resources and do this through the integrated and holistic nature of governance concerning resource allocation. Finally, the decision-making process is participatory.

CS11. Sri Lanka: Shore Seine Fishery, Western, Southern and Eastern Coastlines
(Panayotou, 1982)

This case study demonstrates the manner in which diminishment of restrictions on access rights imposes both economic and social costs. The situation is further undermined by facilitating unrestrained competition among traditional and modern fishing technologies. The shore (beach) seine fishery contributed about 60% of the total supply of marine fish in the country prior to the onset of fishery modernization and competition with inshore mechanized fishing starting in the 1960s. Today it contributes about 10% to the fish supply and provides employment to a proportionately smaller number of fish workers.

Resource system: Coastal stretches extending to about two km from shore. Nets operated from shore. At numerous locations along western, south-western, southern and eastern coasts.

Number of resource units generated: 19,920 metric tons (Flewelling and Hosch, 2003c).

Number of resource users: 39,840 employed in operation of the nets (Flewelling and Hosch, 2003c).

Governance: Beach seine nets are registered and operation rights are based on licenses. Government participates in conflict resolution as needed.

Sri Lankan coastal fisheries have a history of traditional property rights in the form of rights of access and closed communities. In earlier times, beach seine owners controlled the access to coastal waters and had associated fishing rights which, along with other property, were subject to bilateral inheritance (by descent or marriage). Although, at the start, each beach seine owner had his own beach in which he had exclusive rights to operate, each of his children had only a fraction, not of his beach, but of his right to fish off the beach along with his brothers and brothers-in-law. While there was no limit on the number of nets that anyone holding rights to access could have constructed, the fishermen in a given beach, being a single kinship group, refrained from constructing additional nets unless they could bring in a catch whose value would have been higher than the cost of the net, that is they acted as a single economic unit. However, following successive inheritance and population growth, each group which had access rights to a beach has grown so large and remote in kinship that owning a net became gradually the means of exercising one's rights to the resource. Alexander (1995) (revised from Alexander 1980), who studied the Mawella beach seine fishery, illustrates convincingly this development which transformed the beach seine into common property:

“If there were twenty nets, a man with one net would receive 1/20th of the annual catch. But after his death his two sons take joint ownership of his net, they each receive only 1/40th of the catch, whereas if one constructs a new net they each receive 1/21st. Thus, although the construction of new nets was clearly uneconomic from the viewpoint of the community as a whole, there were good reasons why individual fishermen, especially those from large families, should construct new nets. The optimum number of nets was reached before 1920 and the consequent increase involved additional investment for which the marginal product was zero.”

Thus, the right of access system, while effective in blocking entry by outsiders, failed to limit the effort (number of nets) employed by the members of the community itself. Although the fishermen were aware that only a fraction of the existing number of nets would have obtained the same catch while generating substantial profits, they had no way of rationalizing their fishery. Instead, they accepted the ownership of nets as a distributional device and they attempted to give equal opportunities to all nets through a rotation system which enabled each net to be used in all locations
and seasons every so many years. This meant equitable sharing of increasing poverty to the point that ownership of a share could not provide for subsistence.

The government, in response, introduced a license scheme which limited the number of beach seines at each community to those existing in 1933, thus destroying the "rights of access" concept; new entrants could participate in the fishery only by buying shares in existing nets. While the legislation opens the door for the sale of shares to people without hereditary rights, it did not prevent the construction of new nets; predictably enough, most shares were accumulated in the hands of a small elite with access to capital which converted a subsistence technology into a profitable enterprise by limiting the number of nets. At present, beach seining, though outrun by modern gear, still remains profitable in some locations where it is controlled by one or two licensees who own the nets and employ crew on a wage basis (Alexander, 1995). In relation to the five attributes of sustainable common property resources management (Ostrom, 1990), described in CS8, the beach seine fishery appears now to be more open to penetration by free-riders who do not have hereditary rights.

In Sri Lanka, traditional property rights are not peculiar to the beach seine fishery. A recent study (Fernando et al., 1982 as cited in Panayotou, 1982) found that Sri Lankan coastal fishing villages are generally "closed" communities in the sense that persons from outside the village are not allowed access to the fishing grounds of the community. Outsiders are not allowed to anchor or beach fishing boats along the shoreline of the community and labor is not recruited from outside the village. These restrictions on entry help to explain why Sri Lankan coastal fishermen, unlike many other small-scale fishermen in Asia, earn incomes appreciably above their opportunity costs. However, the concept of a closed community might be gradually eroded by its very success: labor shortages and the ensuing high labor costs are encouraging the employment of outsiders as crewmen who soon are accepted by the local community and often inter-marry across castes:

"Outsiders by thus becoming insiders provide "sociological bridges" for more outsiders to find entry into what would have once been a closed fishing community which jealously guarded its resources from outsiders. While this brings about an individual gain for the craft-owner ... this is a social cost being incurred at the same time; by breaking the constraint on entry, the community as a whole loses by the setting in motion of a process that will potentially increase the number of competitors on the fishing grounds." (Fernando et al., 1982 as cited in Panayotou, 1982)).

At this stage, it cannot be predicted whether the Sri Lankan closed community barrier to entry will eventually break under the pressure of labor shortages. As an institution which has exhibited considerable resilience in the past, it might adjust itself to accommodate the new circumstances short of opening the door to the "tragedy of the commons" which appears to have been kept at bay so far. However, reduced catches and a high proportion of juveniles, hint at resource destruction by way of overfishing.

This case study was selected since it demonstrates that imposition of concepts that are not fully integrated with the structure and functioning of an ecosystem including geomorphology fails to provide sustainable results even in an approach which seeks to be participatory.

Resource system: A mix of barrier-built estuaries, lagoons and coral reefs.

Number of resource units generated: Information required.

Number of resource users: Several thousand – more detailed information required

Governance: Conceptually based on community based coastal resources management.

The concept of Special Area Management (SAM) involves a collaborative, adaptive and flexible approach to resource management within a geographically defined area. It is now, an integral part of
national coastal zone management policy. It was first introduced to Sri Lanka, in the 1980s, to address the adverse impacts of economic growth in environmentally sensitive areas such as coastal wetlands, which require new management tools and greater collaboration with other agencies (across development sectors) and the public (CCD, 2006). SAM, more than any other policy, provides the geographic scope to address complex ecosystems in relation to structure and functioning. SAM plans and processes have already been partially implemented at nine sites.

Sorensen and McCreary (1990) explained special area planning and management, of which the distinguishing feature is geographic coverage, as requiring:

1. Boundary demarcation of a special area, which is larger than a local jurisdiction, e.g. local government administration (LGA) area, and smaller than the entire nation. It has two purposes:
   - to ‘capture’ national resource or development issues that cross states or local government boundaries;
   - to encompass a significant natural resource, an embayment, estuary, watershed or a comparable hydrologic unit in its functional entirety.

2. Special area or regional plans have a multi-sectoral perspective. Sometimes a single sector such as tourism may be the focus, but interconnections are made with the other relevant sectors.

Special area management, as practiced in Sri Lanka, falls into two different classes:

1. Special area management as advocated by the CCD, which is a deviation from the conceptualization by Sorensen and McCreary (1990), and fits into ‘community based natural resources management – CB-NRM (CCD, 1997; White and Samarakoon, 1994).

2. Sub-regional planning more in harmony with its original conceptualization, and includes development issues of national significance (CEA/Euroconsult, 1994).

The CBNRM variant of special area management in Sri Lanka is highly limited in scope and therefore cannot become meaningful to the national development process. Clemmett, Senaratne and Ranaweera Banda (2004) based on a comparative study reported “… in general it has not been demonstrated that SAM is a viable and effective tool for Coastal Zone Management (CZM) as it has not achieved its desired objectives and has been time and finance consuming”. Perhaps the problem was the political nature of SAM implementation where it was assumed that a coastal community alone can drive a management process (White and Samarakoon, 1994).

CB-NRM is an alternative to top-down approaches to management of natural resources (Community Based Natural Resources Management Network. http://www.cbnrm.net/). It has been highly effective where enabling conditions have been provided by way of adequate legislation, advocacy and awareness. Philippines is an example where CB-NRM in coastal settings has contributed significantly to the sustainable uplift of livelihood as well as maintaining the health and quality of coastal resources by way of appropriate laws and participatory mechanisms (Eisma et al., 2005; Oracion et al, 2005).

The notion of “community based natural resource management” is most appropriate when examining the community level aspects of the micro-macro continuum. The closely related concept of "co-management of natural resources” on the other hand, may be more appropriate when it is necessary to emphasize more evenly the various components of the micro-macro continuum, including non community-based stakeholders. CB-NRM does not take place in a vacuum; communities operate within policy and legal frameworks, and can exert some influence upon it. Perhaps, in Sri Lanka the challenge is to establish the enabling conditions for co-management for coastal ecosystems.
(UNDP Maldives, 2006; AEC, 2009)

This case study was selected to demonstrate the potential for mutual cooperation and co-existence of both community interests and private sector interests, where the latter, resort tourism, has become the primary driver of the Maldives economy. CSR provides the conceptual foundation for the collaborative approach.

Resource system: Baa Atoll, an administrative district of Maldives, consists of three separate natural atolls. Situated on the west of the Maldives atoll chain, it consists of 75 islands of which 13 are inhabited with a population of over 11,000 people. The remaining 57 islands are uninhabited, in addition to five islands being developed as resorts.

Number of resource units generated: Information not available.

Number of resource users: Includes populations of inhabited islands as well as the populations of tourist resort islands.

Governance: Consultative decisions among governments, atoll / island administrators and resort operators within the framework of corporate social responsibility.

The objective of this project is the conservation and sustainable use of globally significant biological diversity in the Maldives' Baa Atoll. In the Maldives, atoll ecosystems literally provide the basis for the country’s existence as well as life-supporting services such as shoreline protection and goods upon which the economy entirely depends such as fish and tourism. However, social and economic change is altering consumptive behavior and livelihood strategies, outpacing institutional capacity and sectoral programs to adequately manage them. This in turn is threatening the natural endowment that is essential to maintaining the structure and function of atoll ecosystems, the viability of globally significant biological diversity, and the livelihoods and environmental security of the people.

Most important policy decisions affecting biodiversity are taken at the level of individual sectors, such as infrastructure, fisheries, and tourism. Government initiatives to manage change and mitigate the impacts caused by it are rooted in sector-by-sector approaches, resulting in narrow, sectoral institutions, policies, and interventions. The project's three-pronged strategy is to:

1. mainstream biodiversity conservation objectives into sectoral policies and programs and reinforce multi-sectoral institutional collaboration;

2. conserve biodiversity “in the water” and “on the ground” by establishing protected areas and managing them through innovative national-local and public - private partnerships in Baa Atoll; and

3. relieve livelihood-related pressure on biodiversity by enhancing reef fishery property rights and enabling local people to pursue more sustainable, alternative livelihoods.

By the end of the project, modified sectoral policies and programs will enable institutions to more effectively manage biodiversity. Government, local communities, and the private sector will be partnering to secure the long-term conservation of three protected areas in Baa Atoll. Additionally, local people will be applying new knowledge and accessing new sources of financing in pursuit of alternative livelihoods.

(Bavinck and Salagrama, 2008)
This case study demonstrates the manner in which organized fishing communities (artisanal, traditional and semi-modernized) acquire the political strength to operationalize an extensive TURF without formal legal support. It also illustrates the manner in which organization and numbers can provide political power adequate for resisting manipulation by government interest combined with those of highly modernized, commercial fisheries.

Resource system: Information required.

Number of resource units generated: Information required.

Number of resource users: Information required.

Governance: Information required.

The Tamil Nadu inshore fisheries are characterized by a large variety of fish chains (sequence of interconnected activities that link fish capture to the consumer), varying by sub-region, season, and markets. The export market has expanded in volume as well as in scope since the 1960s, with the most important species being shrimp, fin fish, cuttlefish and squid. The domestic market too is large and intricate, and is served via a large number of channels. A complicated network of processors and traders is responsible for the distribution of produce from fish landing centers to the various centers of consumption.

With the exception of several trade ports, the coastline of Tamil Nadu has historically been peripheral. The marine fishing population of the state, although numerous, is settled in small, homogeneous fishing villages, governed by its own councils and headmen. These authorities take charge over a large range of village affairs, including fisheries. Each village council is acknowledged as enjoying jurisdiction over an area of land and an adjacent sea area, the boundaries of which are fixed in mutual agreement by neighboring villages.

The interest of the British colonial government in marine fisheries was extremely limited in nature and scope. In the post-independence period, the state government of Tamil Nadu, which was granted authority over fisheries in the territorial seas, initiated a change in the late 1950s that later became known as the ‘blue revolution’. This intervention created semi-industrialized, mechanized fisheries constituting a new group of fishers, in addition to the existing small-scale fisheries. The tensions that commenced between these two groups of fishers have continued to the present and are the primary trigger for government involvement in fisheries regulation (Bavinck, 2003, 2005).

The formal government structure (Fisheries Department) seeks to meet the challenge of conflict management mainly through regulations although they are not adequate for fishery resource management. Additionally, fishermen resent the infringements of officials on ‘their’ domain. For these reasons, Bavinck (2001a) concluded elsewhere that “the artisanal [small-scale fisheries] system is the most effective in developing and enforcing fishing regulations”.

The unwritten, yet fundamental clause of small-scale fisheries is that village councils have prerogative over adjacent waters and seashore. As the average distance between villages along this coastline is approximately 2 km, and fishing tends to concentrate in a belt 5 km wide, each council enjoys exclusive control over an average of 10 km². This, however, does not mean that fishers always stay within village waters – in fact, there is a large measure of mobility up and down the coast, and fishers regularly encounter ‘strangers’ on their and others’ fishing grounds. This is taken to be a normal course of affairs; after all, as fishers point out, ‘the fish does not stick to boundaries, so how can we?’ The only condition for fishing in other than the own fishing territory is that one follows up local rules and instructions.

Here village councils and headmen come in. These non-state authorities – often termed ‘panchayats’ or ‘caste councils’ - lack offices, uniforms and regular meeting times, and in fact constitute a variation
of an older Indian pattern of decision making (Mandelbaum, 1970). Village meetings, in which council members and headmen preside, provide local fishers with “...the opportunity to talk over important topics and to arrive at an acceptable decision. Furthermore, such meetings provide a favored platform for tabling disputes and for speaking justice.” (Bavinck, 2001b; Diamond, 2005). Village councils regularly take action to regulate fishing, focusing on the process of technical innovation.

The introduction of new fishing gears or fishing practices often provokes deliberations on their desirability and preferred modes of implementation. It is not unusual for a fishing gear to be banned, or for its implementation to be curtailed (Bavinck and Karunaharan, 2006a; 2006b). There are three reasons for banning or curtailing a new fishing gear or practice: harm to the fishing grounds and the future of fishing, harm to the style of fishing practiced by the majority of fishers, and harm to the community. The first motive in particular is relevant to the concerns of contemporary fisheries management. It means in practice that a village council – or, as is frequently the case, a chain of village councils – takes action to prevent a fishing practice that it considers deleterious for the ecosystem. This rule applies to local fishers as well as to strangers working in the local sea territory, and is enforced by the body of local fishers.

The locus of governance activity in the small-scale fisheries of Tamil Nadu thus lies at the village level. For problems at a higher-than-local level, the fishers of this region have found a special institutional solution, called a ‘panchayat circle’ (Mandelbaum, 1970). According to this old-time practice, councils from up to 20 villages gather on an ad hoc basis to discuss and decide on common problems. More recently, fishers in the region have also formed new-style organizations for political representation and lobbying. However, so far the competence of these organizations has fluctuated significantly with changes in leadership, causing them to be ineffective in influencing fisheries regulations.

Although the small-scale fisher system of regulation continues to stand firm, there is evidence for a gradual weakening of control. Governmental-non recognition and opposition is one important cause. The fact that semi-industrialized fishers transgress into village fishing grounds with impunity also undermines council authority from the outside. Internal factors too have weakened village decision-making. Particularly, the increased integration of the fishing villages within mainstream society, the differentiation of village economies, and doubts as to the legitimacy of council decisions have all affected performance.

Evaluated according to the criterion of representation, the governing system of the village councils of Tamil Nadu possesses noteworthy qualities. The first is that the governing system matches the geographical diversity of the system to be governed. Being located at the level of the individual fishing village, governors are able to react to variations in the fish chain as they occur along the coastline.

The system’s comprehensiveness too has a positive bearing on governability. Every fishing village along the coast possesses a governing system more-or-less of the type described above, and together they cover the inshore waters of the coast up to approximately 5 kilometers distance. The most productive fishing grounds along the Southeast Indian coastline are therefore under some form of management. It has been argued elsewhere that a closely woven regulatory framework of this kind offers important opportunities for governance (Bavinck, 2001b).

The fact that the governors are part of the system to-be-governed also stands out. Fishers jointly take decisions for the regulation of the fisheries, and are responsible for the monitoring of rules and the judgment of offences. At the same time they are the ones being monitored and judged. The involvement of fishers in governing activity is often promoted because it increases the legitimacy of a governing system (Jentoft, 1989). From this perspective, village councils make a useful contribution.
But there are factors too that detract from the governability of the fishery system as a whole. The governing system suffers from a lack of fit with the contours of the ecosystem. Each village unit covers a limited sea territory, the boundaries of which were not constructed to coincide with ecosystem boundaries. This means that many ecosystem changes are beyond the influence of the village council. The same holds true if one takes the village councils together. The inshore marine ecosystem of the coast of Tamil Nadu is part of a larger land and marine ecosystems. The village councils are able to control only a small part of this larger system-to-be-governed.

From the viewpoint of institutional connections too there are disadvantages. Although the governing system at the village level is geared to maximize interactions through the institution of village meetings, at other levels interactions are few in number. Thus the nesting of village councils in larger non-state units, such as panchayat circles, is weak. If such larger units existed in the past, they have largely been worn away. The connections with government agencies, on the other hand, are contradictory and infused with distrust. Although government officers realize that they cannot bypass the village councils in daily affairs, genuine cooperation is rare.

Taken as a whole, the governability of this fishery system is uneven. There are many positive aspects in fisher councils’ governing system, however, that deserve attention and might be built upon.

CS15. India, Tamil Nadu & Andhra Pradesh, CB-FM in Pulicat Lake
(Coulthard, 2008)
This case study demonstrates the need for social and cultural flexibility to be able to adapt to socio-economic changes in the wider society.

Resource system: Segment of estuarine system.

Number of resource units: Information required

Number of resource users: Information required.

Governance: Information required.

Traditional community based fisheries management (CB-FM) at Pulicat Lake, a threatened coastal lagoon in South India, demonstrates the difficulty of fishing communities to adapt to change. At Pulicat Lake, a traditional network of fishing rights and regulations known as the Padu system has enhanced sustainability of the lagoon fishery for many generations. Long established Padu fishing villages inhabited by ‘Pattinaver’ (traditional fishing caste) fishermen are relatively rich in terms of fishing capacity, social status and fiercely defended access to well defined fishing grounds. However, access to the best parts of the fishery comes at a cost and despite a greater fishing capacity; Pattinaver fishermen have become trapped within their profession and are unable to cope with a highly fluctuating resource and diminishing fishing access through Padu restriction. Evidence presented here suggests that caste, culture and tradition play an important role in people's ability to cope with changes in the fishery. Livelihood supported by CB-FM does not necessarily guarantee enhanced wellbeing. Supportive interventions are required to meet the expectations of growing populations that are constrained by traditional culture.

As with many natural resource systems, information on the sustainability of the bio-physical fishery resource is scarce. Existing information does not reveal whether the lake fishery is undergoing a 'real' decline, or whether the current poor fish catches are part of the natural cycle of the lagoon's interactions with monsoon rains. The decline of the fishery and possible causes are hugely contested issues. Evidence is scattered, uncoordinated and largely insufficient to derive any conclusion. Within such confusion on the state of the fishery and its future, livelihood coping mechanisms of fishing families increasingly seem like a vital only path for managers to follow.
CS16. Sri Lanka, CB-FM in the Nearshore Shrimp Fishery in Negombo
(Jayawardena et al., 2004)
This case study was selected to demonstrate the feasibility of TURFs in open, nearshore coastal waters (not partially enclosed by backwaters and estuaries). Traditional knowledge enables establishment of a boundary for the TURF.

Resource system: Nearshore sea bed. Information required.

Number of resource units generated: Information required.

Number of resource users: Information required.

Governance: Information required.

A study was conducted to evaluate the shrimp trawl fishery in the seas off Negombo and Hendala during the period January 1998 to December 1999. In the shallow seas off the west coast trawling is conducted by two types of crafts viz. 3.5 t wooden boats (motorized trawls) and traditional sail driven large dugout canoes (non-mechanized trawls). The total catch effort and the catch per unit effort showed seasonal variations. A seasonality in the trawl fishery was observed with a peak period from June/July to October/November, which apparently coincided with the south west monsoon and the inter monsoon periods of the island.

The origin of coastal trawling in Sri Lanka dates back to about a hundred years. Initially, nets used by the local fishermen were simple square or triangular shaped bags (‘Lensu dela’, ‘Kathumaram dela’) which were made up of natural fibers (Cotton, Hemp etc.) and used traditional crafts for operations (Weerasooriya, 1977). In the sea off Sri Lanka, trawling is restricted to small scale shrimp trawling on smooth muddy areas of the continental shelf, especially near the estuarine and coastal waters (Jayawardane and Dayaratne, 1998). Where modernized trawling does not compete and enter into conflict over a traditional resource (i.e. penetrate traditional TURFs) conflict is minimized.

In recent times (1992) shrimp trawling in the seas off Chilaw was banned as a result of a dispute between the two fishing communities (traditional and motorized trawl fishermen) sharing the same resource. Therefore, shrimp trawling is now restricted to Negombo and Hendala, in the western coastal waters of Sri Lanka. In addition trawling is the major fishing activity taking place in the shallow coastal waters off Negombo and Hendala, exploiting the parent stock of shrimps, which utilize Negombo Lagoon for completion of the early phase of their complex life cycle.

CS17. India: The ‘Blue Revolution’ experience of Village Governing Councils – Tamil Nadu
(Bavinck, 2003; Menon & Viswanathan, 2009)
This case study was selected to demonstrate that even on the scale of a ‘state’ such as Tamil Nadu in India appropriate participatory decision-making systems (governance) has the potential to exist within nested and coupled jurisdictions.

Resource system: Information required.

Number of resource units generated: Information required.

Number of resource users: Information required.

Governance: Information required.

Tamil Nadu is the southernmost Indian state, in the BOBLME-SA, that already boasted a strong and sizeable artisanal fishing sector prior to the Blue Revolution. The artisanal sector was divided over three fishing regions—the Coromandel Coast, the Palk Bay, and the Gulf of Mannar. Having largely been left to themselves, the fishing population of the state had evolved a distinct legal system
governing fisheries practice over the ages. This legal system hinged on the institution of *panchayat* (village councils) (Bavinck 2001a, 2001b). These are not connected to the system of government administration. Village law, thus, provided for territorial use rights and emphasized the regulation of fishing technology. While technical innovation was generally encouraged, village councils regularly banned the use of harmful technology for ecological or for social reasons.

The Blue Revolution brought about a new fisheries sector in Tamil Nadu, based on trawling. Trawler fishers were concentrated in harbor towns and soon created professional organizations, which fashioned their own versions of fishing law. These associations established daily courts, delivering justice on disputes that took place with regard to trawler fishing, espousing principles at variance with *panchayat* practice. Thus, while aiming primarily at technological development, the Blue Revolution sowed the seeds of legal pluralism, which became more intricate again with the emergence of state fisheries law.

Although a part of Tamil Nadu is subject to the same developments mentioned above, Ramnad District possesses special features. The district is situated midway along the shore line of Tamil Nadu, bridging the Palk Bay and the Gulf of Mannar. It is an area otherwise known mainly for drought and rain-fed agriculture. The fishing population, which counted 30,304 in 1957, had increased to 105,464 in 2005 due in part to substantial immigration into fishing. This population inhabits 141 settlements of mixed composition. The interspersed Christian, Muslim, and Hindu fishing populations of varying castes and origins is one of the defining characteristics of Ramnad fisheries. Research shows that this heterogeneity has affected the strength of *panchayat* law in artisanal fishing. It has also contributed to the fragmentation of trawler fisher populations, and of their professional organizations. All in all, fisher law is less effective in Ramnad District than it is in other parts of coastal Tamil Nadu.

The proximity to Sri Lanka is another defining characteristic of Ramnad District. This has given the area a reputation for smuggling and, more recently, for violent clashes involving vessels from Tamil Nadu fishing in Sri Lanka waters. These vessels are regularly pursued by the Sri Lankan navy, the sea wing of the Tamil Tiger guerilla movement or, by extension, the Indian navy. The enduring civil war in Sri Lanka, and the tendency of the Indian trawler fleet to search out under-fished grounds, has caused the central government of India to base a substantial control system in Ramnad. Although the Fisheries Department is the main governmental agency regulating fishing, the security interests in Ramnad have reinforced the state’s potential for exerting real control. Compared to other parts of Tamil Nadu, therefore, the state legal system is more powerful and effective in Ramnad.

Following cessation of the ethnic conflict between the LTTE and the Sri Lankan military, the northern waters on the Sri Lankan EEZ again became accessible to the Sri Lankan fishers. This required withdrawal of the Indian fishermen who had benefitted from illegally fishing in Sri Lankan EEZ. However, voluntary withdraw is apparently not forthcoming. In the face of increasing competition the legal Sri Lankan fishers have begun agitating for a solution. The Indian and Sri Lankan governments are now negotiating for a peaceful resolution of a transboundary issue that may otherwise escalate into violence, as reported in the Sri Lankan media.

The Tamil Nadu Marine Fishing Regulation Act of 1983 was devised to contain the conflict between trawler and artisanal fishers, which spread all along the coastline. It had little effect, however, as the measures it introduced were difficult to implement, and the feuding parties did not support them sufficiently. It was only when the government, via a system of implicit co-management, started involving the fishing industry in devising agreements suited to the circumstances in the various regions, that a measure of effectiveness was attained.

In Ramnad District, the main agreement is about 'time zoning'. As in the other districts of Palk Bay, following a series of debilitating conflicts, the trawler fisher associations of Ramnad agreed with artisanal fishing organizations and local government authorities to a system whereby trawlers would fish three days a week, leaving four days to artisanal fishers. This measure is enforced through a
tightly controlled system of tokens, passes, and identity cards, implemented by the Fisheries Department, but with the tacit support from the central government agencies mentioned above. The system would not work, however, without receiving endorsement from the fishing industry. This is monitored partly through a system of monthly meetings, in which the District Collector (the chief administrator) gathers with representatives of the fishing industry to discuss current affairs.

In conclusion the situation of legal pluralism in Ramnad District has evolved towards a form of co-management, where the various parties, coordinate their regulatory activities focusing on core issues. This act of coordination, it must be emphasized, has emerged only after significant conflict and power struggle. Co-management is still incomplete, however. There are many issues about which the parties still fundamentally disagree. Moreover, although state agencies informally involve fisher parties in their decision-making, their role is not formally defined. In other words, there is no explicit structure of co-management in place. Whatever co-management occurs is informal in nature.

CS18. Bangladesh: Community Based Coastal Resources Management in the South-eastern Bangladesh (Deb, 2008; 2009).

The purpose of this case study is to demonstrate the inadequacy of information in regard to fishing methods that contribute significantly to marine fish production. Generally it is stated that CB-FM and CB-ICM are rare or absent in the coastal waters in Bangladesh. Artisanal capture fisheries generally are 'portrayed as open access, unregulated, multi-gear and multi-species fisheries' (Flewelling and Hosch, 2003a). This implies that artisanal fisheries generally tend to overexploit and destroy available stocks. The fisher management authorities tend to regard some fishing methods such as estuarine set bag nets (ESBN), the subject of this narrative, with concern since it is assumed to contribute to overexploitation of white shrimp resources (Flewelling and Hosch, 2003a). The following narrative from a particular village suggests that the situation could be more complex. Closer study is warranted in order to determine if widespread traditional management practices exist and to identify how such practices maybe improved. These practices if suitable may be consolidated with adequate support from government for co-management.

This narrative provides information that suggests the need for vigorous research to fill the existing knowledge gap. The traditional CB-FM referred to in this narrative occurs in Maizghona fishing village, Saharbeel Union of Chakaria Upazilla in Cox’s Bazaar District. The village is almost 100% caste-based Hindu consisting of 121 households with a total population of 898 (Deb, 2008). This village was included in the Empowerment of Coastal Fishing Communities for Livelihood Security (see CS1). The fishing method used is the ESBN referred to previously. The traditional CB-FM consists of the ‘faar’ system. The ‘faar’ refers to the management system as well as to the fishing grounds controlled by the communities. Within a ‘faar’ exist subdivisions termed ‘patas’ which represent specific areas for setting nets irrespective of time limit. This strictly exercised management institution (rules of operation) grants fishing entitlements to members through rotating fishing sites. The fairness of the allocation system imparts sustainability to traditional management. The management system is socially recognized, the rules of operation are enforced, and exclusive based on hereditary rights. It operates on TURF principles although not legally recognized. The net-fixing sites are allocated on a fortnightly and/or yearly basis. Governance is under the control and supervision of village elders (sarders).

Resource System:

The lower estuaries of tidal rivers which permit the operation of ESBN fishing. This is a vast and complex network of waterways where early stages of penaeid shrimps seek refuge and grow before migrating back to the sea for breeding.

The resource units generated by the system:
The total production from ESBNs was 121,251 metric tons, contributing 6% to total marine fishery production (Flewelling and Hosch, 2003a).

Resource Users:

Information is not disaggregated by villages. In 2000/2001 the number of fishers directly engaged was reported as 100,000 (Flewelling and Hosch, 2003a).

Governance:

Information inadequate. In particular villages such as Maizghona referred to in this narrative, decisions are made by village elders (sarders).

2.2 Analysis of the BOBLME-SA Case Studies: The Reference Model

The analysis of case studies has been undertaken using the Reference Model (RM) or analytical framework represented in Table 4. The elements presented in the RM serve as evaluation criteria. The analysis has been completed in two stages:

Stage 1: Screening. The case studies are screened in relation to the elements or criteria in the Reference Model (RM) (Table 4) to identify the extent of correspondence with the required attributes.

Stage 2: Evaluation - Analysis of the good and improvable practices. Based on the level of correspondence to the criteria the case studies are further classified into those that exhibit ‘Good’ and ‘Improvable’ practices (Table 5).

These practices provide snapshots of fishery-based coastal land uses. Lessons were extracted from an analysis of the geographic setting and the decision making process. The lessons are expected to demonstrate the foundation which can contribute to learning in CBICM. The context for lessons, for the purpose of this review, is provided by geography, demography, technology, socio-economics, and socio-politics.
Table 4. The Reference Model (RM) represents findings of FAO (Greboval, 2002; Swan and Greboval, 2003, Hilborn, 2007), and APFIC (2005), a multi-partner consortium including FAO, supplemented with World Bank/FAO (2009) and IPCC (2007a,b) which shows the elements that facilitate sustainable fisheries by way of mainstreaming.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>• Good Governance</td>
<td>Rights.</td>
<td>1) An enabling policy and legal framework;</td>
</tr>
<tr>
<td>• Appropriate Incentives</td>
<td>Transparent, participatory management.</td>
<td>2) The participation and empowerment of communities</td>
</tr>
<tr>
<td>• Reducing Demand for Limited Resources</td>
<td>Support to science, planning, and enforcement.</td>
<td>(and other users);</td>
</tr>
<tr>
<td>• Elimination of Poverty and Providing Alternatives</td>
<td>Benefit distribution.</td>
<td>3) Effective linkages and institutions; and</td>
</tr>
<tr>
<td>• Improving Knowledge of Complex Ecosystems</td>
<td>Integrated policy.</td>
<td>4) Resources – a resource worth managing and the</td>
</tr>
<tr>
<td>• Interactions of the Fisheries Sector with Other Sectors and Environments</td>
<td>Precautionary approach.</td>
<td>people and money to do it.</td>
</tr>
<tr>
<td></td>
<td>Capacity building and public awareness raising.</td>
<td><strong>Disaggregated as (attributes A-I of table:</strong></td>
</tr>
<tr>
<td></td>
<td>Market incentives.</td>
<td>empowerment of communities (A)</td>
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<tr>
<td></td>
<td></td>
<td>agreed roles and responsibilities of the different players</td>
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<td></td>
<td></td>
<td>legal and policy backing at all levels, (c)</td>
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<td></td>
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<td>people with skills in communication, natural resource</td>
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<td></td>
<td></td>
<td>management and problem solving, (D)</td>
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<td></td>
<td></td>
<td>use of traditional knowledge, traditional social</td>
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<td></td>
<td></td>
<td>structures, (E)</td>
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<td></td>
<td></td>
<td>adequate resources – a fishery resource considered</td>
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<td></td>
<td></td>
<td>worth managing, and the people and finances to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>implement the system, affordable transaction costs</td>
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<tr>
<td></td>
<td></td>
<td>of implementing management, (F)</td>
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<tr>
<td></td>
<td></td>
<td>safeguards against rent dissipation (World Bank/FAO,</td>
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<tr>
<td></td>
<td></td>
<td>2009). (G)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>strong government role in equitable law enforcement</td>
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<tr>
<td></td>
<td></td>
<td>and maintenance of law and order (Hilborn, 2007).</td>
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<tr>
<td></td>
<td></td>
<td>mitigating the chronic disaster embodied as creeping</td>
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<td></td>
<td></td>
<td>marginalization and impoverishment of a segment of</td>
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<td></td>
<td>traditional and artisanal fishing communities in</td>
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<tr>
<td></td>
<td></td>
<td>terms of their exposure and risk. (I)</td>
</tr>
</tbody>
</table>
Table 5. A comparison of case studies with attributes of the Reference Model (RM) to enable classification of particular practices as Good and Improvable. The notations A-I* refer to the attributes provided at the bottom of the table. The relevant case study narratives are given under corresponding numbers (e.g. CS1 – CS18). Key: Yes – present with legal backing; Informal – present, no legal backing; Nil – absent, not mentioned in literature; Unclear – information inadequate; Transitory – confined to project life; Included – arrangements exist for consultation / application). The far right hand column signifies overall livelihood impact of each case study as: positive (+), negative (-) or (+/-) signifying that the impact on livelihood is unclear based on the literature provided.

<table>
<thead>
<tr>
<th>Case Studies from the BOBLME-SA</th>
<th>Attributes of Reference Model Used in Classification of Case Studies (see foot of table for explanation of notations A – I)</th>
<th>Classification as Good and Improvable Practices</th>
<th>Impact on Livelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stake Net Fishery</td>
<td>TURF in operation</td>
<td>Better practice to be used in learning?</td>
<td>Potential role of TURF?</td>
</tr>
<tr>
<td>------------------</td>
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<td>------------------------</td>
</tr>
<tr>
<td>CS10. India, Andhra Pradesh: shore seine fishery</td>
<td>Yes Yes Nil / Informal Yes / Informal Yes Yes Nil / Unclear Nil Unclear</td>
<td>+</td>
<td>*</td>
</tr>
<tr>
<td>CS11. Sri Lanka: shore seine fishery, W, S, E coasts</td>
<td>Yes Yes Yes Yes Yes Yes / Unclear Yes / Unclear Yes Unclear</td>
<td>+</td>
<td>*</td>
</tr>
<tr>
<td>CS12. Sri Lanka: special area management (SAM) of ecosystems</td>
<td>Transitory Unclear Yes / Unclear Unclear Unclear Nil / Unclear Nil Unclear</td>
<td>+/-</td>
<td></td>
</tr>
<tr>
<td>CS13. Maldives: fishery and tourism interaction</td>
<td>Yes Yes / Unclear Unclear Yes / Unclear Yes / Unclear Yes Uncler Unclear Unclear</td>
<td>+</td>
<td>*</td>
</tr>
<tr>
<td>CS14. India, Tamil Nadu – TURF in near shore coastal fishery</td>
<td>Yes Yes Nil / Unclear Yes Yes Yes / Unclear Nil / Unclear Unclear Unclear</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>CS15. India, Tamil Nadu, Pulicat Lake.</td>
<td>Yes Yes Nil Yes Yes Unclear Unclear Unclear Unclear</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>CS16. Sri Lanka, Negombo, nearshore shrimp fishery</td>
<td>Yes Yes Informal Yes Yes Yes / Unclear Unclear Unclear Unclear</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>CS17. India, Tamil Nadu – Blue Revolution</td>
<td>Yes / Unclear Yes / Unclear Informal Yes Yes Informal / Unclear Unclear Unclear Unclear</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>CS18. Bangladesh - CBICM on South-eastern coast - ESBN</td>
<td>Yes Yes Informal Yes Yes Yes / Unclear Unclear Unclear Unclear</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

* Meaning of notations A-I
A. Empowerment (ability of individuals to make choices, level of organization of groups, ability of groups to negotiate rights with government, capacity to resist change imposed by government or elites, inclusiveness in plans, etc)

B. Responsibilities / rules / roles of stakeholders, where resource user organizations behave in ways that limit pressure on a resource

C. Legal and policy backing from government that secures rights seek redress through case law, safeguard property rights, etc.

D. Skill availability in terms of personnel who understand the resource and its dynamics, communication, techniques of natural resource management, mapping, monitoring, assessing, research, etc

E. Traditional knowledge use, extent to which information based on long term experience with fishery resources are used in decisions leading to good governance

F. Adequacy of resources – a resource that is worth managing, transaction costs are acceptable for sustaining innovations.

G. Safeguards against rent dissipation – the value of the fishery resource may be diminished by various factors including pollution and corruption.

H. Strength of government – the will and capacity to enforce laws and development fairly.

I. Existence of measures to reduce risk in marginalized coastal communities to safeguard life and property in the face of climate change.

2.3 Clarification of Meaning and Content of Terms in the Reference Model in Actual Practice

The content and meaning of the terms used in the RM are not uniform in practice. They demonstrate nuances, for example ‘rights’ are considered a factor of highest importance in terms of tools of management may be identified in a number of different ways; (a) individualized (but not as Individual Transferrable Quotas (ITQs)) by virtue of hereditary membership in registered, licensed societies supported by formal legislation and territorial boundary as in the case of the Sri Lanka’s Negombo Lagoon stake net fishery (CS8), or (b) collective right as in the case of the Coastal Fishery Zone in the Maldives (CS6), relatively less formal without backing but enforced by the government, or (c) informal and traditional but adequately strong to survive even in the face of weak government support (by the State Government) as in the case of Tamil Nadu (CS14). Many terms used in the RM are similarly nuanced and complex. The following examples of case studies serve as examples that clarify and illustrate the wide range in application of the terms and attributes in the RM. Similar interpretation applies to all case studies, but for the purpose of this review, it is deemed adequate to summarize as shown in Table 5.

The following three examples have been included to provide further clarification of the terms used in the Reference Model (RM):

Example 1: CS6. Maldives – Exclusive Fishing Rights in the Coastal Fishery Zone
The Maldivian small-scale fishers are provided exclusive use of the Coastal Fishery Zone (CFZ). They do not require a license. Thereby a ‘right’ to fish is provided to the Maldivian national by exclusion and penalization of non-nationals. The CFZ thus serves as an area with informal ‘territorial use rights in fisheries’ (TURF). This right ensures primarily that ‘the demand for the limited resource’ that could potentially ensue is reduced by preventing non-nationals from competing with Maldivian nationals.
Reportedly, the government through the Department of Fisheries, consult with the political leaderships of the Atolls and other relevant regional leaders while making decisions. This demonstrates sharing of decision-making that embodies good governance. Some loss of value of the fishery stock occurs when various forms of preferential/illegal practices provide access to elite interests resulting in rent dissipation. The small-scale fishers have been empowered by the TURF, and by responsiveness of the Maldives Coast Guard in terms of receiving complaints and apprehending violators. Thus the government develops mutual confidence and trust with the small-scale fishers, who operate by using traditional knowledge, and they in turn contribute to more effective monitoring, control and surveillance (MCS). The government bears the transaction cost of apprehending violators by maintaining a responsive coast guard since the tuna resource in the CFZ is worth managing and contributes 7% to GDP, 17% to employment and 66% by value of export commodities. The fishery sector and the tourism sector are now beginning to collaborate within the framework of corporate social responsibility demonstrating interaction with other sectors including biodiversity conservation. This interaction with other sectors is further illustrated in CS13.

The Government of Sri Lanka has allocated exclusive fishing rights to the Stake Net Fishery Societies of Negombo to operate their appliances in the channels that connect with the sea, from dusk to dawn, by way of a gazette notification thereby providing formal legal and policy backing. The particular spots at which the stake nets are operated are fixed and do not shift. These serve as the TURFs. The stake nets operate in keeping with a strict set of rules with agreed roles and responsibilities that incorporate traditional knowledge. Violations are invariably punished. The management which is entirely traditional is transparent and participatory based upon democratic principles. Since the government formalized an existing practice in CBFM the services are utilized of people with existing skills in natural resource management. The government contribution toward management of the fishery involves little or no transaction cost except where conflict resolution is necessitated and where national agencies conduct research. Overall the resource is regarded as adequate for formalized policy and legal backing. The membership of the stake-net fishery societies are empowered to a high extent by government policy and legal backing. As a group it exercises political power and resists all changes imposed by other political groups including interests that seek to undermine the authority of its democratically elected leadership. This contributes substantively to maintaining incomes and reducing poverty of the stake net society members, and to equitable distribution of benefits. However, negative externalities of industrial pollution, land capture that impinges on fishing stations and mangrove planting for land capture that causes sedimentation and destruction of net fixing stations are persistent and cause rent dissipation. The government position is strong in regard to the fishery but weak in relation to management of factors of rent dissipation.

(Bavinck and Salagrama, 2008)
The coastline of Tamil Nadu (excluding several trading ports) has historically been occupied by marine fishing villages (homogeneous communities) governed by their own village councils and headmen. The councils take charge of fishing, based mainly on their traditional knowledge and social structures, which includes an area of coastal land and adjoining sea, about 10 km², thereby establishing an informal right. These areas over which the councils acquire exclusive control support a TURF for a village. However, village members sometimes operate in the TURFs of other villages. This is in keeping with agreed rules and regulations. These rules and regulations are developed by non-state authorities, the ‘panchayats’, where village councils and their representatives come together, discuss and arrive at mutually acceptable decisions - governance. Thus the boundaries are established in consultation, sharing of decision-making (governance), with neighboring villages. The State Governments, although backed by legislative authority, do not directly become involved in fishery management other than conflict resolution between traditional fishers and recently developed commercial (modernized) fishers. Thus the management system by village councils and panchayats demonstrate capacity in using the services of people with traditional skills in
communication. Village councils may take decisions to regulate and/or ban types of fishing gears thereby reducing demand for limited resources. Enforcement is by a body of local fishers. Higher level decisions which cover larger areas of land and sea are done through consultation at ‘panchayat circles’ which again share in decision-making – governance. The traditional system of governance by village councils appears to be weakening because of non-recognition and opposition by government – demonstrating its own weakness in government (i.e. inequitable administration of laws). As a corollary, the absence of strong government results in industrial fishing encroaching into traditional fishing grounds (TURFs) of artisanal fishers, violating agreed ‘panchayat’ rules and remaining unpunished. The overall consequence could be reduction of the quality of fishing grounds leading to rent dissipation and increased social costs.

2.4 Limitations of Mainstreaming CB-FM / Co-management for CB-ICM

The diversity in the structure and operational areas of the small-scale fisheries situated in the many ecosystems within national jurisdictions have a significant influence on the impact of mainstreaming on coastal productivity and on livelihood. Some examples provide clarity:

- The stake-net fishery in Negombo Lagoon, Sri Lanka (see Case Study CS8) is an example of mainstreamed co-management. The decline in the average productivity of each direct stakeholder in this system is influenced by the other forms of fishing within the resource system, and more importantly the negative externalities from non-fishery land uses. Therefore mainstreaming of particular fisheries in isolation within small ecosystems, does not guarantee that livelihood aspects (e.g. income) are automatically safeguarded unless government takes responsibility to mitigate negative externalities of land uses from the wider ecosystem that dissipates fishery resource rent.

- The national fishery in the Maldives that occurs in the Coastal Fishery Zone (CFZ) demonstrates mainstreamed co-management by a combination of formal and informal institutional mechanisms (see Case Study CS6). Because of the size of the operational area of the CFZ and the fishery contribution from it to economic growth, the smaller fisheries from nested subsystems such as island coral reefs are also safeguarded. The property rights to the island coral reefs and collective rights in the CFZ have acquired balanced co-existence. The integrity of CFZ as a TURF may endure to the extent that the state (government and associated interests including the multinational corporate sector) remains firm in its commitment to the livelihoods of the national fisher population (Hilborn, 2007).

- CB-FM and informal co-management occurs in the traditional/partially mechanized coastal small-scale fishery in West Bengal, Orissa, Andhra Pradesh and Tamil Nadu situated in about a five nautical mile stretch of its broad continental shelf (CS9, CS10, CS15). This same continental shelf is shared by modernized shrimp trawling and gill netting, etc. The shrimps have a life cycle that is spent partially in the inshore estuaries and in coastal waters. Modernized shrimp trawling results in a total quantity of discards at sea estimated to be about 600,000 tons/year (Pramod, 2010). In the event that the discards are a part of the catch that would have been otherwise taken by the traditional small-scale fishery, mainstreaming of existing CBFM and co-management within this segment of the coastal fishery alone may provide little positive livelihood impact. The problem stems from competition for a ‘shared resource system’ between more efficient and relatively less efficient technologies where boundaries overlap excessively.

- Management does not exist of the coastal small-scale fishery that occurs on the broad continental shelf in Bangladesh. However, interventions are being tested in empowering coastal communities to promote co-management (CS1). The small-scale fishery occurs almost entirely on the continental shelf including shrimp trawling. At the same time a population of about 500,000 of the poorest (including women and children) are involved in
shrimp post larvae collection (CS2). The potential interactions between the traditional / modernized small scale fishery and post larvae collection and their livelihood implications are not known.

Similar interactions are at play on diverse scales within national jurisdictions in the BOBLME-SA as well as where transboundary effects occur. The nature of shared resource systems and their complex interactions will determine livelihood implication of mainstreaming CB-FM and co-management. These relationships also will determine who benefits and who loses where interplay occurs between less efficient traditional fisheries activities and more efficient modernized fisheries. The traditional and partially mechanized small-scale fishers could typically be the losers in such a contest resulting in greater marginalization. Imparting a ‘political voice’ to the potential losers is one option that may contribute to more equitable sharing of resource systems within the framework of CB-ICM.

2.5 Analysis and Lessons
The case studies, based upon screening (Table 5), allow the following generalizations and lessons pertaining to management of the coastal and marine fishery sector in the BOBLME-SA. Additional perspective may be obtained from the publication by a group of researchers (McClanahan, et al., 2009) who have examined the global literature in relation to livelihoods and biodiversity (Section 4, 4.1, 5):

- Fifteen out of eighteen (83%) of the case studies classify as better and improvable fishery management practices since they combine elements of empowerment, informal and formal TURFs, informal and formal government support by policy and legal mechanisms at the minimum. This reveals that a range of informal and formal institutional arrangements coexist to support management practices, and lend themselves to more refined co-management where policy and legislation may contribute to their consolidation. These demonstrate extremes (Figure 1, Introduction) of CB-FM with little or no role for the government (CS7, CS9, CS10, CS14, CS15, CS16, CS18) to a significant role of the government which, may or may not, seek to exclude resource user participation (e.g. CS3, CS4, CS5). CB-FM, where it exists, is invariably linked to diverse forms of TURFs. This is a fundamental and significant element required for sustainability in CBFM and in co-management (Hilborn, 2007).

  Lesson: geo-spatial information for the 70% of case studies to enable their placement on national maps to enable meaningful EAF is weak to lacking.

- Only one (6%) of the case studies that classify as better and improvable management practices occur in the oceanic waters of the EEZs, Viz. fishing in the Maldives CFZ. The geographic locations of the other 93% of case studies are located in partially enclosed waters of backwaters and estuaries (CS8, CS9, CS15) and in inshore coastal waters (CS16). The spatial scale on which CBFM and co-management exist, therefore, span a few hectares (CS7) and square kilometers (CS8, CS9, CS15, CS18) to about 500,000 km² (verification required), the Coastal Fishery Zone of the Maldives (CS6). The extent of the Maldives Coastal Fishery Zone is larger than Bangladesh’s EEZ, about 50% of India’s EEZ component of the Bay of Bengal, and almost the size Sri Lanka’s entire EEZ.

  Lesson: The potential to increase production of artisanal small-scale fisheries from refinement of CBFM toward co-management in the coastal inshore waters where overexploitation is already evident is highly constrained or impossible. Simultaneously negative externalities from land-based sources of pollution and competing land uses are continuously diminishing the economic value of fisheries (rent dissipation).
Lesson: The Maldives case study (CS6) is suggestive of the space into which inshore small-scale fishing may expand in Bangladesh, India and Sri Lanka. In these countries land is the major limiting factor that keeps pushing increasing numbers into artisanal fishing in coastal inshore waters.

- Reversals have occurred in the application of technology (switching back from mechanized to non-mechanized fishing) practices in some case studies where CB-FM exists. Therefore technology by itself is not a guarantee of improvement in income, the total economic context matters. Modernization during the past three or more decades has contributed substantially toward expansion of opportunities as well as to marginalization of artisanal coastal inshore fishers in Bangladesh, India and Sri Lanka (Brown, Staples and Funge-Smith, 2005; Salagrama and Koriya, 2008).

Lesson: Introduction of technology may be more suitable in the wider context of the social-ecological system of small-scale fishers and within a more equitable development process.

- A substantial increase in fishery yields has occurred from oceanic fisheries in the EEZ in the Maldives. This may be partially attributed to the operation of rights / TURF (CS6). In India and in Sri Lanka, significant contributions to national fishery production have occurred from expansion of small-scale fisheries into offshore waters even in the absence of TURFs (see Section 3).

Lesson. The existing outlook that lives of small-scale fishers may improve mainly from refinement of management practices requires careful review. The position of technology and capacity expansion into EEZs of Bangladesh, India and Sri Lanka in a manner that equitably benefits marginalized artisanal small scale fishers requires comprehensive re-evaluation not through more analyses but by planned action (National Reports BOBLME Stage 1; Hall et al., 2010).

- Diverse forms of rent dissipation are undermining traditional small-scale fisheries in estuaries (e.g. CS8, CS12), lagoons and inshore coastal waters. These include natural change, land-based sources of pollution (CS14), negligence of authorities, corruption, land capture for competing forms of development, among many more factors that may emerge in site specific analyses (CS8, CS12, CS14).

Lesson: The diverse forms of rent dissipation have to be addressed, perhaps by way of rigorous application of EIA, law enforcement, and integrated land use planning / management within the framework of ICM.

- CS3, CS4 and CS5 demonstrate that ‘fishery cooperatives’ that can be an effective element in co-management become ineffective when imposed on fishing communities by governments even with the intention of facilitating livelihood uplift. In the absence of voluntarism, and participatory decision making the intervention is faced with high risk of self-destruction. They may survive mainly with government patronage.

Lesson: Interventions that are excellent in concept and potential, fishery cooperatives (CS3, CS4, CS5) entrain vicious circles (instead of virtuous circles) when implementation is flawed. Potential exists for restoration based on ideals of voluntarism and good governance.

- CS2 demonstrates the challenge of high concentrations of poor people in fishing as an ‘activity of last resort’ since they are placed in an ‘equity trap’. They disregard the law to eke out a living. This creates aggravated ‘risk’ in the face of climate change consequences (see Section 3). The equity trap requires breaching by way of targeted development that would create enabling conditions for these poor to acquire security of life and property. CS1 demonstrates a potentially appropriate intervention. See the following section on Livelihood.
Lesson: Recent catastrophes including the Asian Tsunami 2004, Cyclones Sidr and Aila emphasize that risk reduction through adaptation interventions for exposed coastal populations must begin now rather than later to avoid prohibitive costs resulting from postponed action (HM Treasury, 2006).
2.6 Alternative Livelihood

The purpose of this section is to examine ‘the creation of alternative livelihoods among fisher communities in the region; i.e. activities designed for the purpose of reducing impact on coastal resources’. The Introduction contained the definition used during the BOBLME Stage 1 after Carney (1988). This definition (Box 3) draws on a range of experiences and suits the evolving framework that matches FAO’s Ecosystem Approach to Fishery Management - EAF (FAO, 2003) and the concept of resilience (Adger et al., 2005). Importantly, a sustainable livelihood must not become a victim of well intentioned policies, which when implemented, result in unintended outcomes such as environmental degradation, marginalization of small-scale producers and their families or see benefits captured by other interest groups or elites (see Introduction; APFIC, 2009). The Reference Model (Section 2.3) used in the assessment of case studies in this review, indicates that ‘the participation and empowerment of communities’ is one of the pillars of mainstreamed co-management (FAO, 2003; APFIC, 2005). In this context the objectives of this section are:

- Recognize the opportunities and limitations for improving coastal livelihood including: poverty eradication, contribution to economic growth, alternative and diversified livelihoods, aquaculture, protected area management, and risk reduction (FAO, 2005; APFIC, 2005; FAO, 2007a, b).
- Understand the evolving approach toward imparting sustainability to coastal livelihood (FAO, 2007a, b; McCaston, 2005).

Box 3. Livelihood is complex and includes relationships both in the present and in future (Carney, 1988)

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain its capabilities and assets both now and in the future, while not undermining the natural resources base.

The recent implementation of the management plan for the Hilsa fishery in Bangladesh illustrates aspects of mainstreaming co-management through collaboration among government, small-scale traditional fishers and NGOs, as well as the significance of alternative livelihood in imparting acceptability to seasonal restrictions (Box 4).

Box 4. Implementation of the management plan for the Hilsa fishery in Bangladesh.

Mohiuddin et al. (2009) reveal the manner in which alternative livelihood incorporated into the EAF supported by co-management has contributed to a 40% increase in the catches of Hilsa (Tenuala osa ilisha) from the coastal fishery in Bangladesh. Hilsa is the most important single species fishery in Bangladesh contributing 50% of total marine catch (and 50-60% of global Hilsa catch). The combination of issues addressed, based upon inter- Ministerial discussion, participation of Jatka fishermen and NGOs, and coordinated by the Department of Fisheries were:

- protection of dry season river flows,
- establishment of national fish sanctuaries for Hilsa,
- enforcement of fishery regulation (e.g. of artisanal trawl fishing),
- integrated coastal management (ICM), and
- monitoring for maintaining ecosystem health

The government allocated significant funds for alternative livelihood including cage culture during the seasonal bans. NGOs played a key role in training for alternative income activities, monitoring of compliance with regulations and in building awareness.
2.6.1 Reality of Livelihood and Small-scale Fisheries

The FAO (Greboval, 2002; Swan and Greboval, 2003) recognizes that the elimination of poverty and providing alternatives are essential for the promotion of sustainable small-scale fisheries. APFIC (2009) notes, based upon the collective experience of countries in the Asia-Pacific region, that many fishing communities are caught in a poverty trap because they are dependent on a resource base that is declining. This requires more fishing and increased costs, which drives them further into poverty. Finding alternative livelihoods for these people is not easy. Most have limited access to land, capital or assets and live in remote areas. Many of the solutions offered are usually very simplistic and are not based on a full analysis of the costs and benefits of these alternatives.

During regional consultation a viewpoint that emerged based on reality is that it is “time to face up to some truths”, including that a growing number of coastal fishers are going to struggle to maintain their livelihoods. Many do not want their children to take up their occupation and although diversification may be able to maintain status quo, it will not be sufficient to move these people out of poverty. The solution is much more long term and governments have a responsibility to assist fishers to move away from their dependency on fishing and assist with compensation, e.g. fishing boat and gear “buy-back programmes”. Most importantly, education and skills training is needed for the next generation so that this group is prepared to adapt to future opportunities and options (APFIC, 2009).

Alternatives can be categorized as being (APFIC, 2009):

- Within a community or outside of the community and being extractive or non-extractive. However, extractive options such as aquaculture have a number of negative impacts, including the fact that sustainability is questionable. Because fish need to be caught as feed for aquaculture this can increase rather than decrease fishing pressure.

- Policies such as moving fleets to fish farther offshore can provide alternatives, but increased fishing capacity that develops offshore can move back inshore and cause more problems in the longer term.

- Non-extractive options such as tourism may be available, but a number of prerequisites are required and many fishers are not in positions to benefit. Other resource-independent options such as small shops and business are a possibility, but need business skills. Handicrafts and village industries are one such option. Most fishing communities do not have access to capital and credit. Formal credit systems see lending to these communities as too high a risk and are reluctant to lend. To offset this, many schemes such as revolving funds have emerged (APFIC, 2009).

Raising the income of marginalized small-scale fishers is not the only thing that counts in improving their lives (Jentoft, Onyango and Islam, 2010). As Sen (1983) argues, “...when it comes to health, or education, or social equality, or self-respect, or freedom from social harassment, income is miles off the target.” Neither would increase in catch necessarily provide any secure supply of such entitlements, as stressed also in an FAO report: “Poverty in fishery dependent communities ... is not solely related to the abundance of the catch, market opportunities or the state of the resource. It is also critically dependent on how the benefits from the use of fishery and other resources are used and whether a range of basic services (e.g. in health and education) are provided” (FAO 2006).

Much of the fisheries literature assumes that the provision of alternative employment is an adequate response to the problem of poverty in fishing communities faced with depleting resources (Pauly, 2005; Hilborn, 2007; Hall et al. 2010). Recent research shows that this assumption does not necessarily match the perceptions of active fishermen (Pollnac and Poggie, 2008; Pollnac et al., 2001). Providing alternative employment which ensures equal or even higher income does not
guarantee that fishermen would leave their fishery occupation (World Bank, 2000) since the concept of happiness also enters into perceptions (Easterlin, 2003; Kahneman et al., 2006).

APFIC (2009) noted that there is a need to find alternatives for unsustainable fishing within the fisheries sector as many fishers do not want to move out of the sector (Box 5). It was accepted that education and skills training for young people might be a long-term solution, but options within the sector are needed now. For some people fisheries is already an alternative livelihood. Taking up work on larger fishing vessels is one example. When looking for alternatives to fishing it was noted that it is important to remember there is also an increased demand for fish both globally and locally and some people need to do the fishing.

Box 5. Tsunami affected fishers prefer to remain in coastal fishing

The findings of Salagrama and Koriya (2008) from their study of post-2004 Indian Ocean Tsunami in Tamil Nadu uphold the reluctance to leave fishing for alternative livelihood. This finding is significant since the affected fisher communities apparently were in a mood to choose safety for life and property over exposure to future hazards. However, their choice was eventually motivated by greater certainty of putting food on the table rather than long-term expectation from reduced risk to life and property. Salagrama and Koriya (2008) report that:

The majority of affected coastal communities chose to stay in the fishery sector for two reasons: (i) the robustness of coastal fishery stocks, and (ii) absence of employment opportunities elsewhere.

There is a strong case to support existing livelihood activities by enhancing people's access to the necessary assets and policy-institutional mechanisms in order to help them make more viable livelihood choices.

Options for diversification are really few — and not really much more viable than those the fishers would leave behind. This is not to discount the idea of livelihood diversification altogether: it has all along been an integral part of life in fishing communities. This makes developing appropriate responses to their need for livelihood diversification urgent and essential. However, livelihood diversification cannot be based on simple 'A to B' calculations, and requires a more nuanced understanding of the people and their choices. Most importantly, it requires building upon the fishers' strengths, and developing the responses as organic outcomes of their choices rather than as artificial add-ons imposed from outside.

One other point needs to be noted: there have been very few successful examples of livelihood diversification outside fisheries. Even an activity like brackish water aquaculture, which deals with the same products as marine fishing, has failed to be a viable alternative — because it has a farming rather than fisheries orientation.

APFIC (2009) during regional consultation on best practices in livelihood noted that the choice of target beneficiaries and identification of diversification options in a project or programme to support livelihoods of fishing-dependent people will depend on the main objectives of the programme and the orientation of wider economic development and environmental management policy. Typically, diversification in a fisheries context is promoted to achieve one or more of the following outcomes:

- Economic accumulation: improved incomes, asset base or wellbeing of fishing and aquaculture-dependent people; poverty reduction and economic growth;

- Reduced vulnerability: reduced risks of failure, buffer against seasonality, shocks and adverse trends e.g. climate change; and

- Reduced pressure on natural resources: reduced fishing effort, reduced demands of aquaculture on ecosystem services.

APFIC (2009) further noted evidence that diversification has achieved its resource governance and livelihood enhancement objectives is limited because there has been little systematic monitoring of
project and programme impacts. Based on different case studies, there are conflicting views on whether promoting diversification leads to reduced fishing pressure, with some studies indicating that household livelihood diversification leads to unsustainable fishing. Other studies point to alternatives leading to a reduction in time spent fishing and of greater likelihood that fishing activity will be reduced when stocks are low and when people have alternative means of securing income and food. Linking diversification to improved fisheries governance is essential if any such synergies are to be maintained.

### 2.6.2 Implications of prevailing consciousness in development planning and livelihood

The literature reveals that a gap exists between the outlook of development planners and the outcome of implementation of plans for sector development in relation to livelihood. The problem of marginalization of traditional small-scale fisheries was the outcome of development planning in Bangladesh, India and in Sri Lanka (Kurien, 2005; Marga, 1981; BOBP, 1997). An important historical consideration here arises. What was the consciousness that prevailed among development planners at the onset of fishery modernization which resulted in the marginalization of traditional small-scale fishers? This is because, generally, the consciousness that creates a problem cannot be applied toward its solution. Issues of unintended consequences follow from deficiencies in consciousness (see Introduction, Section 1.7). A historical perspective shows that two forms of contrasting consciousness applied at the onset of modernization to Bangladesh, India and Sri Lanka on the one hand, and to Maldives on the other:

- **India and Sri Lanka:** The existing problem of marginalization of small-scale coastal fishers arose from the planning attitude that prevailed in the 1960s. It was assumed that the demonstration effect of fishery modernization would induce the traditional small-scale fishers to voluntarily abandon their 'risky' sea-going fishing craft in preference for the 'safer', more efficient modern boats (e.g. Government of Ceylon, 1951; Raghavan, 1961; Kurien, 2003; 2005). The playing field was uneven, and the traditional small-scale fishers did not receive assistance to develop capacity to make the transition.

- **Bangladesh:** Fishery modernization, mainly for export, occurred since the 1970s. The development attitude that prevailed was to promote investment with little consideration to the livelihood of traditional marine fishers who were mainly Hindus (Deb, 2008, 2009). Consequently the ownership of the resource moved out of the hands of fishermen into the hands of wealthy businessmen and traders (BOBP, 1997). The independent, small-scale traditional fishers became labourers on investors' boats.

- **Maldives:** Modernization started in the 1970s based upon building the capacity of existing fishers. Marginalization did not occur relative to elites' capture of some benefits. Many small-scale fishers, in response to modernization, have changed their behaviour, even to the extent of staying many days at sea. They are the backbone of the existing modernized fishery where production has increased almost six-fold to its present level of about 200,000 tonnes per year (Adam, 2004; BOBP-IGO, 2009).

An altered consciousness is emerging in Bangladesh (BOBP, 1997). The actions needed for safeguarding livelihood and production are identified as the need to 'ensure resource access on a priority basis to poor shore-based fishermen, then to offshore fishermen, then to commercial fishermen'. However, some elements of the same consciousness that existed in Bangladesh, India and in Sri Lanka at the onset of modernization appear to still persist in the latter two countries (Kurien, 2003; 2005). Further export-oriented fishery expansion is envisaged without adequate geographic integration (and zoning safeguards) for inshore coastal fisheries. Perhaps 'alternative employment' and 'employment diversification' may become more appropriate within an ICM framework for absorbing excess fishing capacity. In the Maldives, a contradiction may taint the past and prevailing consciousness, in the event that vested interests are allowed to influence the future expansion of its fishery in a manner that results in rent dissipation (see Section 3).
2.6.3 Poverty and Economic Growth

The linkages among fisheries, poverty and economic growth were explored by DFID in 2005 through a study across eight countries including Bangladesh and India (Alam, 2005; Salagrama, 2005). The main findings, in relation to policy implications for Bangladesh and India reflect disjuncture between economic growth and the wellbeing of traditional small-scale fishers. DFID (2005) in its policy brief presented consensus among these countries as follows: "From the viewpoint of natural resource exploitation and management, one important change in thinking has been the renewed recognition of the role of economic growth in development, with greater emphasis being placed on the distribution of benefits ('pro-poor growth'). Research into pro-poor growth continues, but consensus has emerged in some key areas:

- Economic growth is essential for poverty reduction, and in principle growth as such does not seem to affect inequality;
- Growth accompanied by progressive distributional change is better than growth alone;
- Education, infrastructure and macro-economic stability seem to positively affect both growth and distribution of income."


Clearly, economic growth occurred in the modernized segment of the small-scale fishery in Bangladesh, India and in Sri Lanka since the 1960s, while parallel marginalization also continues to increase in the other segment, the traditional / artisanal small-scale fishery which operates in the coastal and inshore waters (see Section 3). Economic growth alone does not ensure equitable distribution unless meaningful mechanisms exist for equitable distribution of benefits. The main contributions to economic growth in these countries are from exports based on coastal shrimp fishery and offshore fisheries (including cuttlefish/cephalopods). Pramod (2010) demonstrates the possibility of contradictions between modernized shrimp trawling and incomes of traditional inshore fishers who may be sharing the same fishery stock in India. Some case studies in Section 2, e.g. Tamil Nadu demonstrate that informal zoning already operates. The significant question is whether future increases in production from these segments could be sustained in a manner that contributes toward fishery sector growth that also benefits the poor. One part of the answer lies in national fishery policy linked to equitable growth, while the other part is included in the conceptual framework that supports planning and policy implementation that links the welfare aspects of fishery to growth in other sectors such as tourism as in the Maldives.

2.6.4 Economic Growth and Human Development

Livelihood enhancement as reflected in changes in the human development index (HDI), growth of the economy as shown in the gross domestic product (GDP per capita) and level of income poverty indicate the impact of economic policies as well as growth in coastal development sectors. Table 1 reveals that the Maldives achieved impressive growth in the economy, while eliminating income poverty. The most significant contribution to growth in the Maldives economy was from coastal tourism as well as from the modernized, offshore small-scale fishery. Elimination of income poverty, however, does not ensure enhancement in all the indicators associated with the HDI. For instance, underweight children (aged under 5 years), an indicator associated with the HDI, continues to reveal the need for improvement in child nourishment in the Maldives (Table 1).
2.6.5 Implications of Other Land Uses for Small-scale Fisher Livelihood

Coastal land use other than direct small-scale fishing has the potential to contribute to both economic growth in general and livelihood enhancement of small-scale fishers. APFIC (2009) provides comprehensive coverage of alternative livelihoods as well as opportunities from diversification in the Asia-Pacific Region.

In this review examples of coastal aquaculture and protected areas are briefly examined because of the consequences of policy that did not produce intended results (also see Introduction, Section 1.7).

Coastal aquaculture

Bangladesh - Shrimp Culture

An example from Bangladesh illustrates both the potential in aquaculture and some entrained contradictions. Bangladesh made major advances in shrimp culture in the 1970s and 1980s through small-scale enterprise conducted by poor coastal communities that partially depended on coastal fisheries (Box 6). The complex network of production-based interactions made positive contributions to rural livelihood (Bene, Mcfadyen and Allison, 2007).

Several grant and loan supported fisheries projects in Bangladesh contributed to further expansion of this sub-sector in the 1990s through infrastructure development for enhanced water management. The final report of the Fourth Fisheries Project (World Bank, 2007) conveys a sense of mixed outcomes from interventions in further development of shrimp aquaculture, particularly in regard to delivery of targeted livelihood benefits to the poor, the very group who initiated the activity, including:

- In terms of shrimp farming, the distribution of relative benefits of improved water management (and so production increases) is likely to go to larger farms that had better production to start with, and are thus less likely to be poor.

- Nevertheless, with the project, all groups benefit from the improved water management capacity and management.

- The establishment of a voice for the landless through their committees and representation in block and polder committees has been a considerable achievement.

- The landless have gained fishing access to canals (khas land) through committee agreements. They have also been engaged to a greater extent in labour on gher (pond) and canal rehabilitation.

- Initially there was a subcomponent on improved shrimp fry collection methods with training of 30,000 shrimp fry collectors, most of whom are very poor, women and children. This component was dropped when the government banned wild fry collection.

- The government was unwilling to look into further capacity support to former fry gatherers (many of whom are in fact continuing due to lack of alternate activities), despite them being among the extremely poor, since wild fry collection had become an illegal activity under the government ban. A GEF funded study also found that these small scale shrimp fry collectors do not have a major impact on fishery resources, compared to larger nets.

Shrimp aquaculture in Bangladesh as a sustainable alternative livelihood requires careful evaluation based on long-term outcomes. Shrimp farming physically invades farmland, and saltwater intrusion can change soil composition and pollute water supplies. Shrimp aquaculture has had direct impacts on crop productivity, on the health and livelihoods of rural farming communities and availability of
seasonal jobs of small-scale fishers (Environmental Justice Foundation (EJF) 2003; Samarakoon, 2007). During the late 1990s, rice production in the coastal zone decreased by 26 percent, while the cultivated area decreased by only 1 percent (Islam 2004). Recent research (Alamgir Choudhury, personal communication) suggests that reversion to rice cultivation is occurring in some coastal polders in Bangladesh where adequate irrigation water is available from shallow tube wells (Samarakoon, 2007).

Land use conflict stemming from expansion of shrimp in Bangladesh and in Andhra Pradesh, India have caused severe adverse impacts. Land seizures have occurred on a grand scale, affecting hundreds of thousands of poor inhabitants of coastal communities. In Bangladesh, an estimated 120,000 people have been driven from their farmland in the Satkhira region alone, either due to declines in food availability or under direct pressure from shrimp farming interests (Box 7). In the Indian State of Andhra Pradesh, 48,000 people were displaced in just three years (EJF, 2003).

Aquaculture, such as shrimp farming, does not guarantee livelihood opportunities for small-scale fishing communities nor for poor coastal communities in general. Both policies and law enforcement need to come together within an implementation framework that is designed to benefit the poor (Joffre et al., 2010).

Box 6. The significance of shrimp in the rural economy of Bangladesh prior to development of the industry through diverse development assistance.

A DFID-funded study in 2001 mapped the supply chain for bagda shrimp production in Bangladesh – an activity that is solely small-scale in nature except for the export-oriented processing companies. About 50,000 shrimp farms existed providing direct employment for 166,485 people and generated value-added/income of 5.6 billion Takka*. The indirect employment was calculated as an additional 141,642 people with value-added/income of 1.75 billion Tk. For the supply chain as a whole 86% of people were in “unskilled/poor” category, revealing the importance of bagda-related activities for the poor. Similarly 61% (of 4.45 billion Takka) of the income accrued to the “unskilled poor”, 27% to the "semi-skilled, middle income" and only 12% to the rich. Input/output analysis showed the value of the output multiplier was such that for a million Takka expansion of shrimp exports, total output of the economy would increase by 2.153 Takka million. The estimated percentage of household income in the supply chain was 60% revealing high dependence on shrimp related activity (Bene, Macfadyen and Allison, 2007).

US$1 equalled approximately 58 Takka in 2001.

Box 7. Bangladesh – Human rights violations and shrimp culture

In Bangladesh, murder, kidnapping, bomb attacks, violent intimidation and rapes linked to the expansion of the shrimp industry have become regular occurrences. Since 1980, over 150 people have been killed in violent clashes related to shrimp farming. The true figure is unknown as deaths are not always reported to or by the police, but it is thought by a non-governmental organisation, Nijera Kori, to be close to 200. Frequently implicated in murder are Bangladesh’s ‘musclemen’ – hired enforcers paid by shrimp farmers to protect their interests and further their ambitions. At demonstrations, clashes have occurred between landless protestors and police or musclemen. Shrimp farm guards have caught and beaten to death innocent fry collectors and adolescents passing through the farms, suspecting them of coming to steal shrimp. Musclemen have attacked and killed poor villagers and seized their land for shrimp farming. Witnesses in legal cases linked to the industry have been murdered. Deaths have also resulted from rivalry between groups of shrimp farmers or musclemen.

(Source: EJF, 2003)

Protected Areas

Expert opinion is divided on the scientifically testable contribution of protected areas toward safeguarding fishery stocks. Pauly (2008) presents arguments as a proponent of protected areas.
Hilborn (2002; 2006) regards protected areas as lacking scientific evidence. The role of protected areas as a direct instrument in fisheries management itself may require more research before a firm scientifically testable position emerges (Pitcher and Lam, 2010). Opinion also is divided on the impact of protected areas on livelihood.

Protected areas serve multiple functions and their contribution to coastal livelihood requires assessment within each local context. Maldives has twenty-five reef protected areas that serve recreational interests of tourists while contributing toward enhanced incomes of small-scale fishers in associated islands. Protected coral reef systems in Sri Lanka also provide income to small-scale fishers by way of tourism-related services (CCD, 2006). The extensive shorefront mangroves such as in the Sunderbans Protected Area, Bangladesh, and more restricted extents in the Indian Sunderbans, West Bengal are known to contribute significantly toward deflecting and partially absorbing the energy of cyclones and storm surges, as it did during the 2007 Cyclone Sidr. The defensive function of extensive and appropriately dense shorefront mangroves and the relevant complexities are documented by FAO (FAO, 2007a; 2007b).

The livelihood concerns of small-scale fishers in regard to marine protected areas in India discussed recently at a workshop convened by the International Collective in Support of Fishworkers - ICSF (http://www.icsf.net/icsf2006/jspFiles/ma/index.jsp) are relevant to BOBLME-SA in general. The case studies discussed at the meeting, highlighted that “... large numbers of men and women in fishing communities—an estimated 10 per cent of marine fishers in India—are facing loss of livelihoods due to restrictions on fisheries in coastal and marine protected areas. Moreover, feelings of victimization and alienation due to the manner in which regulations are implemented are common, while efforts at creating alternative livelihood opportunities have remained limited. Also, there has hardly been any systematic effort to improve access to basic services for enhancing long-term livelihood options. The focus has been mainly on regulating fisheries, while serious issues of degradation and pollution by non-fisheries factors have not been dealt with, which compromises the very objectives for which the protected areas (PAs) were set up.”

Protected areas pertaining to biodiversity such as turtle conservation have a direct impact on small-scale fisher livelihood. The Orissa Traditional Fishworkers’ Union (OTFWU) pointed out that in the Gahirmatha (Marine) Wildlife Sanctuary, nearly 30,000 active fishers are affected by turtle protection measures, 43 per cent of whom are below the poverty line. OTFWU has put forward several proposals to protect the fishers’ livelihood interests while simultaneously meeting conservation objectives.

The representatives of artisanal and small-scale fishworker organizations, organizations in support of fishworkers, environmental groups, and the scientific community, committed to equitable and socially-just conservation, use and management of coastal and marine living resources participated in the workshop on “Social Dimensions of Marine Protected Area Implementation in India: Do Fishing Communities Benefit?” in Chennai in 2009. They made the following recommendations:

- Integrate fundamental principles of participation, environmental justice, social justice, and human rights into the implementation of marine and coastal protected areas.
- Address threats to coastal and marine ecosystems from non-fishery sources.
- Enforce the marine fishing regulation act in all the states and union territories.
- Adopt legislation to conserve and manage living resources of the EEZ.
- Adopt an integrated approach for the management of coastal and marine living resources.

2.6.6 Comprehensive Approaches to Livelihood
The need for improving coastal livelihood is a problem mainly facing Bangladesh, India and Sri Lanka since it has stemmed, at least, partially from failed development policy and the unintended
consequences of implemented projects (see Introduction Section 1.7). A major commitment is required by the respective governments to rectify the development failure that is now aggravating in the form of ‘creeping normalcy’. Creeping normalcy occurs where directional change in a measurable attribute of a social-ecological system occurs gradually until it crosses an irreversible threshold. The enhancement of livelihoods, by arresting ‘creeping normalcy’ requires targeted interventions by the government based upon sharing benefits from economic growth within the sector (DFID, 2005). This may be achieved to an extent by mainstreaming CB-FM and co-management (APFIC, 2005; APFIC, 2008). Case Study (CS1), Empowerment of Coastal Communities for Livelihood Security (Government of Bangladesh, 2005) demonstrates the meaning and content of a comprehensive approach to addressing livelihood enhancement on a pilot scale (Brown, Staples and Funge-Smith, 2005).

Mainstreaming of CB-FM and co-management must also give consideration to the differential impacts of overfished coastal resources on women, men and children. The women and children in coastal fishing communities in Bangladesh and in India constitute more than 50% of the population owing to a combination of effects including migrations of male heads of households, abandonments, and various other poverty-related effects (Box 8; Alam and Giassudin, 2005; Salagrama and Koriya, 2008). Some women face great hardship because of income poverty. Men who cannot any longer earn an income from fishing also face displacement and hardship. Migrations of men from fishing communities in Bangladesh and India sometimes occur to distant locations such as the Gulf Countries resulting in flows of remittances that benefit both national coffers and dependents (Khatun et al., 2005). In Sri Lanka, migration of women to these countries and their remittances contribute substantially to poverty reduction in coastal communities (World Bank, 2008). Thus the gender influences and relationships that shape livelihoods in coastal communities are diverse and complex.

Box 8. Bakul: A Mother’s Story (Alam and Giassudin, 2005).

Bakul Begum lives in Barguna Sardar, Bangladesh. Due to extreme poverty as a fisherman, her father arranged marriage on the precondition of a dowry payment. Months after the marriage, Bakul’s husband started to claim extra money. Payment bought temporary peace for the newlyweds. Soon after the first child, a girl, was born the husband became physically abusive. As a consequence Bakul returned to live in her father’s home. Shortly thereafter she started a catering business with borrowed money, paid off loans and set up a shop. With her new-found assets she returned to living with her husband and gave birth to a second daughter. Her husband now become her fair-weather companion during periods when her income rises and gets abusive at other times. Out of concerns for the future of her daughters, and despite frequent physical abuse, she persist with her tortured life.

Bene, McFadyen and Allison (2007) in the FAO Technical Report 481 based on consultation with small-scale fishery and livelihood specialists provide a detailed analysis of the relationships between small-scale fisheries, poverty alleviation, food security and economic growth. They list the factors that contribute to small-scale fisher vulnerability, all of which contribute in interacting ways to the fragile livelihoods of small-scale fishers in Bangladesh, India and in Sri Lanka:

- Reduced fish stock levels as a result of overfishing.
- Pollution.
- Climate change.
- Increasing prevalence of disease in fishery communities.
- Increasing pressure on land and coastal resource use.
- Marginalization.
- Globalization and greater involvement in market economies.

The foregoing narrative demonstrates that addressing the challenge of livelihood requires both a comprehensive approach as well as targeted interventions that can eradicate income poverty in the
short-term. A comprehensive approach is reflected in the synthesis of experience of organizations that have been involved with grass root level development (McCaston, 2005). The experience of Oxfam International in the Post-Indian Ocean Tsunami affirms the significance of micro-finance institutions in reducing poverty in the short-term.

2.6.7 CARE’s Unifying Framework for Sustainable Livelihoods and Convergence with FAO’s EAF (McCaston, 2005; FAO, 2003)

FAO’s Ecosystem Approach to Fishery Management (EAF) addresses the lives of coastal communities and small scale fishers within a framework of ecological and social linkages (FAO, 2003). Thinking on the subject of livelihoods has been evolving during the past decade based upon development experience of organizations such as CARE International. This has resulted in a new and more comprehensive approach, the goal of which goes beyond poverty alleviation to poverty eradication and social justice, resulting in greater and more sustainable impact. This approach, the ‘unifying framework’ (Figure 6.) converges with FAO’s EAF.

The unifying framework includes institutional reforms that address political and social relationships within the larger societal processes in which coastal communities are embedded. These contribute to the structural changes in the cascade of administrative entities through which the national planning and allocation processes link with the local small-scale fishery units. These linkages create enabling conditions leading to empowerment, one of the pillars in mainstreaming traditional small-scale fisheries by way of strengthened co-management (Table 4. Reference Model). The unifying framework corresponds to FAO’s Ecosystem Approach to Fisheries Management (EAF). The shift to poverty eradication in the unifying framework includes, symbolically, (i) teaching people how to fish – imparting skills for asset building, (ii) ensuring that people have access to the river (or coastal waters) as a resource which includes mainstreamed property rights, and (iii) ensuring that companies up river are not polluting the water source, i.e. building safeguards against rent dissipation stemming from negative externalities (see Section 3). Natural disasters constitute one set of the causes of poverty addressed in the unifying framework (Figures 6 & 7).

Figure 6. The unifying framework developed by CARE International which represents a comprehensive approach to poverty eradication as the necessary attribute of development.
since they cannot choose safer locations, or if they are not supported by measures to reduce risk, i.e. the probability of harm (see Section 3). The 2004 Indian Ocean Tsunami forced the attention of the world community on the manner in which an acute disaster (an event to which a date and time can be given), changed a chronic disaster into a catastrophe where more than 230,000 members of coastal communities perished across the region. This event virtually wiped out the coastal marine fishery along the northern, eastern and southern coasts of Sri Lanka including fisher lives (Government of Sri Lanka / FAO, 2006. The loss of property including fishing gear reduces the ability to sustain livelihood (Pomeroy et al., 2006). A chronic disaster occurs where marginalization and progressively increasing poverty (creeping normalcy) places communities at increased risk (see Section 3) (Adam et al. 2009; Donner and Rodriguez, 2008; Hoffman, 2003).

Risk = Hazard (frequency and severity) x Vulnerability (exposure/capacity) (UN ISDR, 2004; U.S. Indian Ocean Tsunami warning System Program. 2007). The relationships among livelihood, vulnerability, exposure and risk are presented in some detail in Section 3 for the BOBLME-SA. The challenge is the continuing anonymity / amorphousness of the dispersed, small-scale fisher communities, particularly along the coasts of Bangladesh, India and Sri Lanka.

Figure 7. CARE International’s Unifying Framework for Poverty Eradication and Social Justice. Note ‘Risk and Vulnerability management’ under Human Conditions (McCaston, 2005).

2.6.8 Micro-finance Institutions and Poverty Reduction
The combined impact of economic marginalization of coastal fisher communities, and graver impacts on women and children have resulted in the recognition of the urgent need to reduce income poverty among women. The NGO sectors in Bangladesh and in India initially played a key role in delivering micro-credit to rural poor, particularly the women (Islam, 2004; Karmakar et al., 2009). In recent years, the governments of Bangladesh and India have institutionalized major interventions for
reducing primarily the income poverty of women and in parallel facilitate their integration into mainstream development processes.

Women’s participation in programmes of micro-finance institutions (MFIs) ranges from about 60% in Sri Lanka to over 80% in Bangladesh and in India. The total gross loan portfolios of MFIs in these three countries in 2007 were reported as exceeding thirty million US dollars (Karmakar et al. 2009). In the same year the total number of participating women exceeded 32 million with the size of the average loan being in excess of a hundred US$ 100 (Karmakar et al., 2009). Clearly substantial potential exists for micro-finance/micro-credit to further develop into an effective instrument for reducing income poverty, the crucial element in day-to-day food security.

APFIC (2009) noted that despite the increasing importance of microfinance as a poverty alleviation tool and the consequent rapid growth in microfinance loans and borrowers in Southeast Asian countries, the rural poor, particularly the traditional small-scale fishers, still rely primarily on private moneylenders and other informal sources of loans and continue to have no access to the financial services of banks and other financial institutions. Is the situation similar in the BOBLME-SA? How can small-scale fishing communities become partners in the mainstream micro-finance processes that are regulated and have the potential to contribute toward poverty reduction among the small-scale fishing communities?

APFIC (2009) noted that some obstacles to enrolment of small-scale fishers in bank-based micro-finance/credit in South East Asia are:

- inadequate physical and livelihood assets for collateral,
- absence of organization (and critical mass) to overcome barriers to economies of scale,
- stemming from the above, the inability of banks to (a) establish reliable databases, and (b) minimize transaction costs to an acceptable level.

As a contribution to deliberations at the APFIC Regional Consultation (APFIC, 2009), Karmakar et al. (2009) present a review of micro-finance and micro-credit processes in Bangladesh, India and Sri Lanka with recommendations for its broader application of small scale fishery and aquaculture households. The model developed by the South Indian Federation of Fisheries Societies (SIFFS) spanning several decades for supporting traditional small-scale fishers (Table 6.) demonstrates the possible scope of activities and future directions (Karmakar et al., 2009).

Table 6. The scope of financial support provided by the South Indian Fisheries Societies (SIFFS) for traditional small scale fishery livelihood activities (Karmakar et al., 2009).

<table>
<thead>
<tr>
<th>Purpose of loan</th>
<th>Purpose of loan - category</th>
<th>Beneficiary Class</th>
<th>Group/Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing fishing equipment (motorized)</td>
<td>Production</td>
<td>Men</td>
<td>Individual</td>
</tr>
<tr>
<td>Purchase of fishing equipment (non-motorized)</td>
<td>Production</td>
<td>Men</td>
<td>Individual</td>
</tr>
<tr>
<td>Supply of ice</td>
<td>Post-harvest</td>
<td>Men/women</td>
<td>Individual/group</td>
</tr>
<tr>
<td>Working capital for fish vending/processing</td>
<td>Post-harvest</td>
<td>Women</td>
<td>Individual/group</td>
</tr>
<tr>
<td>Establishment of small businesses (non-fishery economy, etc.)</td>
<td>Alternate employment</td>
<td>Women</td>
<td>Individual</td>
</tr>
</tbody>
</table>
The efforts made by Bangladesh and its pioneering approaches to address extreme poverty are acclaimed as holding promise in the wider context of fundamental rights and environmental security (UN General Assembly: Human Rights Council, 2010). The micro-finance institutions (MFIs) arm of organizations such as the Bangladesh Rural Advancement Committee (BRAC), have been the leaders among NGOs in taking micro-finance (a package including loan credit and insurance) and micro-credit (generally small grants/loans) to the rural poor, particularly women in coastal communities. Community Development Center (CODEC), among others, in collaboration with BRAC and other NGOs has developed mechanisms for addressing the needs of marginalized coastal fishermen (Box 9).

Box 9. Comments on implementation of micro-finance at the field level for coastal fishers
(personal communication Ms. Sagarica Ahmed, BRAC Country Director, Sri Lanka)

Working in the coastal areas of Bangladesh is difficult and extremely time consuming because of problems of access and communications. The NGO sector has been highly effective in their outreach because of trained, dedicated staff. The high illiteracy and cultural obstacles make women in small-scale fisher families very vulnerable. Their lives are fraught with uncertainty and destitution is common because of husbands becoming victims of natural hazards. Boat owners may provide one-off compensation which is inadequate. The key to successful participation of women in micro-finance interventions is targeting and monitoring. Women require ‘hand-holding’ by dedicated staff to enable regular participation until benefits of micro-finance become intrinsically attractive. The micro-finance requirements of fisher women are complex and heterogeneous which implies that ‘supply’ has to be tailored to need. Consequently transaction costs of outreach are very high. Criticism of high interest rates in micro-finance is therefore ill-founded criticism. The staff needs (travel, field expenses, etc) for programme implementation requires designing based upon frequency of monitoring.

Need for caution and good governance

Micro-Credit Ratings International Ltd., a leading specialist microfinance rating agency, reviewed Indian micro-finance and released a report in 2009 (M. Cril, 2009). In the conclusion it states “While this improvement in the performance index (of micro-finance) is apparently a matter for celebration, it may regrettably result in lament. The concern is that the improvement has been achieved due to an emphasis on increasing yield and minimizing portfolio at risk in order to boost the equity valuations of MFIs. As such it may be a short term phenomenon achieved at the expense of relationships with clients and, as discussed above, likely to trigger political intervention with long term adverse consequences for the microfinance sector. An immediate re-focussing of MFI operations on the double bottom line balancing financial returns and social values – client protection and social mission – is essential to ensure the future of Indian microfinance as an instrument of financial and social inclusion and not as another means of exploiting the poor for financial gain” (M. CRIL, 2009).

Comparative performance of MFIs and Self-help Groups: Suicides and Interest Rates

Recent research (Singh, 2011) reveals the need for great caution in placing excessive trust on the performance of MFIs in relation to benefits delivered to the poor. The recent suicides by over 60 poor borrowers in the Indian state of Andhra Pradesh have brought the operations of microfinance institutions (MFIs) under public scrutiny. It is well documented by both print and electronic media that these debt-driven suicides were due to coercive methods of loan recovery used by commercial MFIs. The commercial MFIs operate as profit-making non-banking financial corporations (NBFCs) in India. The majority of suicides took place in Warangal district of Andhra Pradesh and as many as 17 borrowers of SKS Microfinance were among those who reportedly committed suicide. For the past few months, the SKS Microfinance (the largest commercial MFI in India) has been in the news. In August 2010, it raised nearly $380 million in an Initial Public Offering (IPO) - the first from an Indian MFI. Thanks to the IPO, promoters and private equity investors of SKS Microfinance became instant millionaires while their borrowers remain desperately poor.
Contrary to public posturing that MFIs are saviours of the poor and charge reasonable interest rates, several big MFIs in Andhra Pradesh have been charging very high interest rates, closer to the ones charged by traditional moneylenders. Until and unless commercial MFIs revisit their pure market-driven business model aimed at generating super profits for their investors, their operations will remain questionable and unjustifiable in India where 77 percent of population survives on less than Rs.20 per day (less than US$ 1).

Post-suicides, the Reserve Bank of India (RBI) has formed a high-level committee to look into the functioning of commercial MFIs. The report of the committee is expected by early 2011. In an era of deregulated interest rates, it is unlikely that the RBI will put a cap on interest rates charged by the MFIs. Although Bangladesh, the home of microfinance, decided to cap microfinance interest rates in November 2010.

In contrast, there are plenty of self-help groups (SHGs) and micro lenders in India who follow a balanced approach between financial sustainability and social objectives. The SHG model serves many more poor households in India than the MFI model. The microfinance interventions by SHGs and similar groups have produced better results than MFIs because of their integrated approach towards building sustainable livelihoods.

Ms. Sagarica Indu (BRAC-Country Director, Sri Lanka, personal communication) commented that jumping to conclusions is not warranted in the relationship of MFIs and suicide rates. Her personal experience suggests the need for careful identification of underlying causes. Additionally, in view of the practical need for high interest rates, the proportion of suicides to those who have gained from MFIs must serve as a reference.

2.6.9 NGOs and CBOs - The Bridge Between Government and Local Communities

The study by the World Bank (2002) based upon the views of more than 60,000 poor people from fourteen countries revealed insights into how the poor people perceived their position, including:

- A majority felt they are worse off and more insecure than in the past;
- Corruption, irrelevance and abusive behaviour often mar the formal institutions of the state;
- Non-governmental organizations need to be more accountable to the poor;
- Interactions with traders and markets are stamped by their powerlessness to negotiate fair prices.

The challenge is working with the coastal poor in helping them succeed in their own efforts (World Bank, 2002). Despite shortcomings, the better NGOs constitute the frontline of organized interventions to bridge the gap between dispersed and remote coastal communities and the state. The GOB/UNDP/FAO project ‘Empowerment of Coastal Fishing Communities for Livelihood Security’ (see Section 2, CS1) demonstrated the need for the facilitation role of NGOs in the field. A major challenge then rests with strengthening the role of NGOs as intermediaries in the empowerment of fishing communities. Both in Andhra Pradesh, India and in Bangladesh NGOs have taken a key role in empowering women in the poorest communities (World Bank, 2002).

In closing its study World Bank (2002) focused on the ‘... state failure to reduce poverty and human suffering in this age of plenty and of technological marvels. In this context we (the editors) define state failure as a failure to serve poor people. We focus on states rather than other development sectors because governments set the essential policy environment that affect the speed and quality of development. Government policy shapes the actions of poor people, the private sector, NGOs and donors”.

The effectiveness of NGOs or lack of it is determined by the combined influence of the state as well as donors. Much of NGO effectiveness is determined by funds made available by donors. The 2009 report for the Asia-Pacific Region of the Reality of Aid Organization (ROA, 2009) states "Democratic
ownership under the current aid architecture is more rhetoric than reality. Many of the steps forward in terms of aid allocation are accompanied by steps back as countries face indebtedness and loss of development resources and policy space. The use of tied aid and policy conditionalities imposed by donors have direct and negative impacts on the lives and livelihood of the poor, particularly in the Asia and Pacific region where more than 600 million people still live in absolute poverty”.

2.6.10 Rights-based Restoration of Small-scale Fisher Livelihoods.
Progressive consideration has been given to improving the status of small-scale fisheries by assisting in their transition to a rights-based approach including access to resources, markets and social empowerment. The principles supported by COFI during its sessions in 2007 include:

“A rights-based approach, in defining and allocating rights to fish, would also address the broader human rights of fishers to an adequate livelihood and would therefore include poverty-reduction criteria as a key component of decisions over equitable allocation of rights, including in decisions over inclusion and exclusion, gender equality, and the protection of small-scale fishworkers’ access to resources and markets. It would also include addressing deficiencies in fishing people’s rights of equitable access to health care, education, justice and the rule of law. Transition to rights-based fishing requires relationships between fishing rights holders and duty-bearers (such as governments) to be transparent and based on mutual trust and accountability. This requires empowerment of fishing communities, both through their social inclusion and building their capabilities. There is a specific need to protect the poor from adverse impacts of the transition to rights-based fisheries management” (http://www.fao.org/fishery/topic/16152/en).

The rights-based approach to restoration of small-scale fisher livelihood may acquire practical support by way of the international instrument recently included in the resolutions of the COFI 29th Session (www.iisd.ca/vol29/enb2905e.html).
3. ICM and Fisheries Management and Some Basic Concepts Relevant to CBICM in the BOBLME-SA.

This section provides clarity, where necessary, to the contents of Section 1: Introduction, Section 2: Case Studies, and further supports Section 4: Conclusions and Recommendations. Additional clarification is necessary because of (i) the diversity of the status of integrated coastal management and fisheries in the BOBLME-SA, (ii) the richness of the scientific discourse that has developed on the subject of interactions among fishers, markets and the ocean resources in the context of the prevailing global fishery crisis and (iii) the need to examine the reasoning that underlies the conclusions, lessons learned and recommendations.

The objectives of this section are to:

1. Introduce the complexity of the BOBLME-SA and to convey the need to look at the subject of community-based integrated coastal management (CBICM) as a cascade of nested and coupled sub-systems (social-ecological systems).
2. Indicate the national disparities that exist within the BOBLME-SA and the pitfalls of biased generalizations.
3. Indicate the diversity in status of integrated coastal management in the BOBLME-SA since the primary goal of this review is associated with community-based integrated coastal management (CB-ICM).
4. Indicate the trend in marine fisheries, and the 'hidden' complexity of small-scale fisheries, their relationship to the coastal environment and the national expectations of expanding sector growth.
5. Assess the relationship of national positions on fisheries in relation to the international discourse on the 'global fishery crisis'.
6. Indicate the relationship between increasing risk and inadequate recognition of the 'chronic disaster' that is already on the hands of Bangladesh, India and Sri Lanka and implications in the context of environmental security.
7. Impart some clarity to the manner in which rent dissipation in the coastal resource sector is further marginalizing the poorest coastal communities and increasing both their vulnerability and exposure to acute hazards stemming mainly as unintended consequences of planned development within inadequately understood complex social-ecological systems.

3.1 Complexity and Nested Social-ecological Systems

The inherent complexity of the BOBLME, composed of both biophysical and human-made attributes provides the foundation from which planning for effective CB-ICM must proceed. Little can be done about biophysical complexity and inherent natural change except adapting to it. What is possible is situated in the realms of the other attributes of complexity including consequences of historical change, development planning, demography, land use pressures, fishing technology, scientific uncertainty and consequences of globalization that combine and influence social-ecological systems (SESS).

Effective CB-ICM implies that the outcome will contribute to sustainable fisheries management and enhanced coastal livelihood which are inseparably linked with a harvestable stock of fish, crustacean and mollusc populations supported by healthy coastal ecosystems. MacClanahan et al. (2009) assert on the basis of an analysis of better-managed small-scale fisheries worldwide that "... solutions arise from a historical trial and error management process as problems become dire. We find high success
in the social organization and regulation of resources among these progressive fisheries but poor evidence for improved ecosystems”. This carries the implication that in order to make small-scale fisheries sustainable, the social needs initially must take center stage to enable integration of ecosystem considerations on a foundation of community demand.

The literature is expanding on the need to understand situations of multiple relationships of people with nature before they can be adequately managed. Ostrom (2007) presents a practical approach that would enable that understanding through a diagnostic approach (Figure 8). The four categories of information required for diagnosis of relationships that influence the structure and functioning of SESs are clarified in the next paragraph.

Figure 8. A social-ecological system is composed of a set of interacting relationships including bio-physical ecosystem attributes, social relationships, and decision-making (governance) relationships sandwiched between national socio-economic and political settings and the even wider ecological linkages (Ostrom, 2007a, b; Ostrom et al., 1999; Ostrom et al., 2007). Thus a social-ecological system cannot exist as an entity isolated from the surrounding influences. Both FAO’s EAF (FAO, 2003) and mainstreaming of CB-ICM (APFIC, 2005) mirror the dynamics of social-ecological systems.

As an example, the coastal waters of Bangladesh with its vast and diverse small-scale fisher population have local characteristics that enable demarcation of geographic areas that constitute inter-connected sub-systems based upon their operation depths. Sets of small-scale fishers that share some common features operate at different depths. The fishing gear of the operators of estuarine set bag nets set them apart from the shrimp post-larvae collectors who earn an income in the same general area. Thus the estuarine set bag net fishers constitute an SES distinctive from that of the post larvae collectors. The problems and issues of the individual SESs must be diagnosed before management and integration within the wider ecosystem becomes possible in the context of ICM. The wider ecosystem including rivers and coastal waters includes the Hilsa fishery, the management of which is critical because of its national significance.

Distinctiveness may be imparted to an SES when its attributes are recognized and defined. Viz. (i) the properties of the resource system, (ii) the number of resource units generated, (iii) the number of resource users and (iv) the institutional relationships that contribute to resolution of conflict and harmonious use of the resource system (Ostrom, 2007a, b). The coastal zones or regions of individual countries in the BOBLME-SA are heterogeneous where sub-classes of small-scale fisheries co-exist or compete. Some CB-FM and co-management practices described in Section 2 characterize diverse SESs.
3.1.1 The Complex Nature of the BOBLME - South Asia (BOBLME-SA)
The Environmental Profile of the Bay of Bengal Large Marine Ecosystem (Heileman, Bianchi and Funge-Smith, 2010) conveys the complexity of the system under consideration within which some aspects, fisheries, coastal environment and livelihoods are reviewed. In terms of the diverse relationships described in the profile, the definition of CB-ICM used in this review may appear to be an over-simplification. In fact, CB-ICM is a strategic approach which recognizes complexity, but seeks to focus directly upon fishery sustainability, food security, and livelihoods as the three priority problems.

A significant part of the BOBLME-SA is situated within national jurisdictions of individual countries. The rest situated outside national jurisdictions is important, in addition to fisheries, in terms of the global economy in relation to marine transportation, bio-prospecting, undersea communication systems among others (FAO, 2005a, b; World Bank, 2005). Consequently, numerous pressures exist in the ocean segment outside national jurisdictions that impact processes within it. Simultaneously significant transboundary linkages are associated with livelihood in the BOBLME (Samarakoon, 2004). Additionally, the Bay of Bengal is likely to become significant as geopolitical interactions in the coming decades acquire prominence in the Indian Ocean (Kaplan, 2009). Dealing with ‘complex systems’ requires recognition of the inherent attributes of complexity, especially change, unpredictability and emergence (Holling, 1973; ECDPM, 2005a,b; ADB, 2009; FAO, 2003; Ostrom, 2007a, b).

3.1.2 The BOBLME - South Asia (BOBLME-SA): A Region of Disparities
The four countries constituting the BOBLME-SA are characterized by many disparities. Bangladesh is a delta, India is a sub-continental land mass with deltas and an archipelago, Maldives is an archipelago, while Sri Lanka is a large island. Maldives, as the country with the smallest population in the BOBLME-SA, has about 3% of India’s population while its EEZ is slightly larger than the eastern segment of India’s EEZ. The average populations of India’s states are larger than that of Sri Lanka. More disparities occur along other dimensions, including the nature of fisheries. The structure and ecological attributes of their coastal zones are also extremely diverse as is their geography (Table 7). The disparities in distribution and magnitude of critical constituents of coastal ecosystems, mangroves and coral reefs are provided in the BOBLME Stage 1 National Reports and in Angell (2004). Poverty is the foremost, shared livelihood feature of coastal communities in Bangladesh, India and Sri Lanka. Maldives is the exception in regard to poverty (see Section 2).

Table 7. Selected attributes of the BOBLME SA sub-region that demonstrate diversity. (CIA-The World Factbook, World Resources Institute 2010; UNDP, 2009)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bangladesh</td>
</tr>
<tr>
<td>Land area (km²)</td>
<td>144,000</td>
</tr>
<tr>
<td>Length of coastline</td>
<td>580</td>
</tr>
<tr>
<td>Extent of EEZ (km²)</td>
<td>141,000</td>
</tr>
<tr>
<td>Extent / average width of continental shelf (km²)</td>
<td>66,400</td>
</tr>
<tr>
<td>Composition of fishery</td>
<td>98% / 2%</td>
</tr>
</tbody>
</table>
### 3.2 ICM in the BOBLME-SA

The information for ICM provided here is adequate for recognition of challenges in integrating ecosystem management with fisheries management. Uniform ICM does not exist in the BOBLME-SA. Case studies in Section 2 demonstrated the existence of various forms of informal and formal property rights in small-scale fisheries. Practical ICM must proceed from the principle of integrated land use where various forms of property rights may correspond with the diverse social-ecological systems where the dominant economic activity is fishery. Therefore mapping and recognition of boundaries of diverse resource systems is a core requirement for effectiveness of CBICM.

The majority of case studies are situated in coastal settings which are nested within larger segments of the continental shelf. Thus an EEZ and the coastal zone are composed of many layers of social-ecological systems (Figure 8; Ostrom, 2007a,b). Each of these sub-systems which supports a fishery requires geographically specific management. This means that the needs of a sub-system must be diagnosed before meaningful solutions to any problems may be implemented. The ICM briefs for the member countries of BOBLME-SA serve to convey this diversity and complexity of geographic settings.

#### 3.2.1 Bangladesh: The Evolving National ICZM Programme

The coastal zone of Bangladesh covers an area of 47,201 km², or 32% of the country, being the landmass of 19 districts. About 35 million people, representing 29% of the national population, live in the coastal zone (Figure 9). The Government of Bangladesh established a program development

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<table>
<thead>
<tr>
<th>% coastal</th>
<th>scale offshore</th>
<th>fishery</th>
<th>scale offshore fishery about 25%.</th>
</tr>
</thead>
<tbody>
<tr>
<td>traditional / % modernized shrimp trawling etc.</td>
<td>147,365</td>
<td>1,095,351</td>
<td>359,000</td>
</tr>
<tr>
<td>National population (thousands)</td>
<td>81.3</td>
<td>75.6</td>
<td>Nil</td>
</tr>
<tr>
<td>Population segment (%) regarded as poor (income &lt; US2/day)</td>
<td>0.543</td>
<td>0.612</td>
<td>0.771</td>
</tr>
<tr>
<td>HDI (2007)</td>
<td>65.7</td>
<td>63.4</td>
<td>71.1</td>
</tr>
<tr>
<td>Life expectancy at birth</td>
<td>2.06</td>
<td>1.38</td>
<td>2.78</td>
</tr>
<tr>
<td>Rate of population growth</td>
<td>1100</td>
<td>325</td>
<td>2000</td>
</tr>
<tr>
<td>Population density (2002) people/km² (to be verified)</td>
<td>1,241</td>
<td>2,753</td>
<td>5,196</td>
</tr>
</tbody>
</table>

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* GDP / per capita (US$ purchasing power parity): This indicator is used to compare how much a US dollar spent in Bangladesh, India, Maldives and Sri Lanka would buy relative to what the same dollar would purchase when it is spent in the United States. Hence, as an example a US dollar spent in Bangladesh, or any other South Asian country, would buy more haircuts than in the United States. This indicator reduces the vast gaps in income per person that are observed in numbers that represent GDP per capita ([http://en.wikipedia.org/wiki/Purchasing_power_parity](http://en.wikipedia.org/wiki/Purchasing_power_parity)).

3.2 ICM in the BOBLME-SA

The information for ICM provided here is adequate for recognition of challenges in integrating ecosystem management with fisheries management. Uniform ICM does not exist in the BOBLME-SA. Case studies in Section 2 demonstrated the existence of various forms of informal and formal property rights in small-scale fisheries. Practical ICM must proceed from the principle of integrated land use where various forms of property rights may correspond with the diverse social-ecological systems where the dominant economic activity is fishery. Therefore mapping and recognition of boundaries of diverse resource systems is a core requirement for effectiveness of CBICM.

The majority of case studies are situated in coastal settings which are nested within larger segments of the continental shelf. Thus an EEZ and the coastal zone are composed of many layers of social-ecological systems (Figure 8; Ostrom, 2007a,b). Each of these sub-systems which supports a fishery requires geographically specific management. This means that the needs of a sub-system must be diagnosed before meaningful solutions to any problems may be implemented. The ICM briefs for the member countries of BOBLME-SA serve to convey this diversity and complexity of geographic settings.

#### 3.2.1 Bangladesh: The Evolving National ICZM Programme

The coastal zone of Bangladesh covers an area of 47,201 km², or 32% of the country, being the landmass of 19 districts. About 35 million people, representing 29% of the national population, live in the coastal zone (Figure 9). The Government of Bangladesh established a program development
office in 2001 located within the Water Resources Planning Organization (WARPO) of the Ministry of Water Resources to facilitate the Integrated Coastal Zone Management (ICZM) process (Islam, 2004).

The coastal segment of the delta on which the country is situated is highly dynamic. The macro-tides, in some places, with amplitudes ranging in excess of six meters, create changing landforms (morphodynamic features) associated with the numerous tidal rivers that traverse the coastal delta. Human activities are shaped, on the one hand, by river morphodynamics (the manner in which land forms are changed by river flow and sedimentation), while on the other, major coastal engineering projects have created islands of stability (polders surrounded by embankments). Some long term consequences of coastal engineering have created severe socio-economic challenges in some parts, such as the Southwest. The population inhabiting the coastal zone is expected to exceed 60 million by 2050 (Ahmad, 2005). About half of this population may continue to live in the exposed coastal zone situated outside polders which would place them at high risk from coastal hazards.

The Programme Development Office (PDO) completed the initial preparatory phase of integrated coastal zone management in Bangladesh from 2002-2005. As a result, the Cabinet adopted the Coastal Zone Policy and the Coastal Development Strategy. A huge body of knowledge on problems and opportunities in the coastal zone was produced under this project (www.iczmpbangladesh.org, Islam, 2004). A new phase of ICZM is in preparation. The foundation for the new phase was developed in early 2009. This is anticipated to lead to development of adequate legislation for land use management that would also facilitate co-management.

Figure 9. The Bangladesh Coastal Zone of the Bay of Bengal showing the inner and exposed segments (blue and green respectively). An estimated 19 million live in the Exposed Coastal Zone situated contiguous with the Bay of Bengal where land-sea interactions are highly dynamic. The Sunderbans Forest Reserve, the largest continuous mangrove tract in the world is situated in the left quarter of the map (green). The only coral reef in Bangladesh is associated with St Martin’s Island situated about eight kilometers west of the northeast border of Myanmar un-shaded (Islam, 2004)

The policy goal of integrated coastal zone management is to “create conditions, in which the reduction of poverty, development of sustainable livelihoods and integration of the coastal zone into national processes can take place”. Fishery is the key economic activity of ‘last resort’ that supports livelihoods of the majority of poorer residents in the coastal zone.
3.2.2 India

The east coast of India, extending from the international border of India and Bangladesh in the northeast to Kanyakumari in the south, is 4,645km long, covering the states of West Bengal, Orissa, Andhra Pradesh, Tamil Nadu and Pondicherry (Figure 10.). The archipelagic Andaman and Nicobar Islands are included. The population is over 225 million. The Indian states situated along Bay of Bengal have a continental shelf area of 153,000 km². The total area of the EEZ (Exclusive Economic Zone) of India in the Bay of Bengal is 615,500 km². The sub continental coastline is enriched with many river deltas and estuaries. The periodic nutrient discharges and soft bottom marine environments associated with river flows support diverse fishery organisms. The deltas support extensive mangrove habitats. The Indian Segment of the Sunderban mangroves extends into West Bengal. Pulicat Lake and Chilka Lake are significant estuarine-lagoons that support traditional fishery management practices.

The Coastal Regulation Zone (CRZ), or the zone under the purview of the CRZ Notification 1991, was declared to include the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (on the landward side) up to 500m from the high tide line (HTL), and the land between the low tide line (LTL) and the HTL. In the case of rivers, creeks and backwaters, the notification states that the CRZ applies to both banks of the water body, but the distance of the CRZ from the HTL may be reduced from 500m on a case-by-case basis, with the reasons for the reduction being recorded in the Coastal Zone Management Plan (CZMP) of a particular state (Joseph & Balchand, 2000; Ramachandran, 2008; Ramachandran, Enserlink and Balchand, 2005; Ramachandran and Enserlink, 2008).

Figure 10. The coastline and the EEZ of India included in the BOBLME-SA. Several major rivers including the Mahanadi, Krishna, Godavari, Kaveri and branches of the Ganges drain into the sea along this coastline. Large agricultural and urban populations and their waste loads influence coastal water quality. Deltas and estuaries are associated with the coastal reaches of the major rivers (map source ICSF, 2010).

The Ministry of Environment and Forests (MOEF) in 2008 issued a revised Coastal Zone Management Notification. This notification elicited diverse public responses including protests from coastal fishing communities. On 22nd July, 2009 the MOEF issued a public notification captioned 'Lapsing of the Coastal Management Zone (CMZ) Notification, 2008'. Thereby the CRZ Notification, 1991 as amended, continues to be in force and implemented. The notification of lapsing included the
The Minister of Environment and Forests has already decided to have necessary consultation with various stakeholders including traditional artisanal fishers and civil society to seek their comments for strengthening the CRZ Notification, 1991. A detailed plan for the consultation is being prepared.

In a critique of the attempted revision of CRZ 1991, the conclusion stated 'The analysis above also shows that the proposed CMZ Notification (2008) does not deliver on its own objectives of sustainable development, sustainable livelihoods and conservation. The CMZ Notification in its present form exemplifies the recent negative trend of 'regulatory capture' – a conscious process where environmental governance is influenced by commercial lobbies and environmental laws are dictated by investment priorities. The notification remains what it was predicted to be – a sellout of the coast' (Menon et al, 2007; Sridhar, 2007; Sridhar et al, 2008).


Andaman and Nicobar Islands:

The Andaman and Nicobar Coastal Zone Management Authority was established in 2008 under the Environment Act by a Government of India Gazette notification on 18 August 2008. This authority has a validity of three years. Its responsibilities pertain mostly to land zoning.

ICZM projects incorporating fisheries and livelihood

EQUATIONS, an Indian NGO committed to equitable tourism made the following observation in regard to the World Bank financed ICZM Project in Andhra Pradesh (Orissa) and West Bengal. ‘Through the ICZM project the government proposes to use ecotourism and tourism for providing livelihood security to fisher communities. The proposal acknowledges the detrimental impacts of tourism and unplanned growth of tourism infrastructure on the coastal ecology such as degradation of the coasts, conflicts amongst stakeholders and increased pressure on coastal areas. However, it again adopts tourism (small-scale or ecotourism) to provide livelihood security to coastal communities, who are most vulnerable to not only developmental activities but also to effects of climate change’ (http://www.equitablertourism.org/stage/files/fileDocuments782_uid13.pdf).

Andhra Pradesh and Orissa states reportedly face serious environmental problems stemming from shrimp aquaculture by the private sector including multinational corporations (Rao, 2008 http://www.nlsenlaw.org/crz/articles/). Some Supreme Court rulings in relation to the Coastal Regulation Zone are accessible at: http://www.nlsenlaw.org/crz/case-laws/supreme-court/).

3.2.3 Maldives: The emerging situation

The archipelago consists of 26 natural atolls with about 1,200 islands. Of these, 200 islands are inhabited. The total land area is less than 1%. The islands are relatively small in size, with an average area of 25ha. The largest island is just over 5 km². Coastal areas are usually defined as ‘an entity of land and water affected by the biological and physical processes of both the sea and land and defined broadly for the purpose of managing the use of natural resources.’ As reef islands in atoll systems are products of marine biological and physical processes, coral reefs should be treated technically as coastal systems (Nasser, 2007). Because the whole country is considered a ‘coastal zone’, a number of national laws and authorities directly or indirectly govern and administer coastal management in the country. The three agencies primarily responsible for coastal management in the
Maldives are the Ministry of Environment, Energy and Water (MEEW), the Ministry of Fisheries, Agriculture and Marine Resources (MoFAMR) and the Ministry of Construction and Public Infrastructure (MCPI). A part of the EEZ is designated as the Coastal Fishing Zone which extends to 75 km from the islands. This is essentially an oceanic regime where the influence of land use is negligible (Figure 11).

*Figure 11. The boundaries of the Coastal Fishery Zone and the EEZ of the Maldives (Adam, 2004).*

3.2.4 Sri Lanka – The Evolution of Coastal Zone Management

Coastal zone management in its current sense began in the early 1960s when coastal issues received greater attention of the government. The Coast Conservation Act No. 57 of 1981 vested the administration, control, and custody of the Coastal Zone in the Republic of Sri Lanka and appointed a Director of Coast Conservation to be responsible for this. It also conferred the legal responsibility upon the Director to prepare a National Coastal Zone Management Plan (CZMP). The first CZMP was prepared in 1990, its second revision occurred in 2004 giving consideration to the intervening updates (CCD, 2006). The objectives of the CCD are (i) to improve status of the coastal environment; (ii) to develop and manage the coastline; (iii) to improve the living standards of coastal communities and resource users; and (iv) to promote and facilitate economic development based upon coastal resources.

The CCD balances many land uses including tourism with fisheries among others within a narrow legally declared coastal zone (Figure 12). The land use pressures have direct and indirect impact on marine small-scale fishing from the standpoint of operation of gear and craft (for example beach seine fishing) and beach landing. The CZMP addresses coastal fisheries with a view to integrating the sector with ICM. The CCD collaborates with the Department of Fisheries and Aquatic Resources (DFAR) in this regard.
Figure 12. The relationship between the legal Coastal Zone and the EEZ Sri Lanka (CCD, 2006). The legal coastal zone extends to 2 km from the shoreline and constitutes a minute fraction of the EEZ. About 65% of national fish supply is obtained from coastal waters overlying the 25 km wide (average width) continental shelf.

The legal Coastal Zone has relevance to the area in which the beach seine fishery occurs, and to estuaries and lagoons. Fishing activities themselves are excluded from CCD’s legal purview. The CZ has little relevance to the EEZ.

3.3 Small-scale Marine Fisheries: Trend and Implications for ICM

The purpose of this section is to provide some information with regard to recent trends in fisheries development in the BOBLME-SA countries that have relevance to the Reference Model presented in Section 1: Introduction, Section 1.11 and which is applied to the analysis of case studies in Section 2. More detailed information may be obtained from BOBP-IGO (2009). The following attributes are likely to hold significant implications for CBICM:

- the complexity of small-scale fisheries
- anticipated expansion of shrimp trawling / coastal fishing for export,
- implications from illegal fishing (IUU) and state-private sector partnerships with multinational corporate affiliation to exploit deep sea resources in the EEZs, and
- export trade in fishery products.

3.3.1 Understanding the Subdivisions of Small-Scale Fisheries for the BOBLME-SA

Marine and coastal fisheries in the BOBLME-SA, for all practical purposes, can be classified as small-scale fisheries (Box 10). However it is important to realize for the purpose of this review that ‘small scale fisheries’ can also be further sub-divided to reveal the significant internal differences that have evolved during the past several decades since the modernization of fisheries by governments began in the 1960s (Figure 13). Understanding the sub-divisions within small scale fisheries begins with recognizing the distinction between inshore coastal fisheries and offshore fisheries (Figure 13). This separation places the artisanal and inshore fishers in the class that is impacted by coastal land uses and decisions of multiple stakeholders since they operate within that particular geographic realm (Figure 13). Their operational sites are diverse, they may be scattered and relatively inaccessible or they may even be urban. Their markets are local and they play a key role in nutrition and food security (Kurien, 2005; Hall et al., 2010). Generally, as a consequence artisanal and inshore fishers would receive primary consideration in CB-ICM since they have direct relationship with multiple uses.
of coastal resources. By simplifying in this manner a mental model may be created of artisanal and inshore small-scale fisheries that fits firmly into FAO’s ecosystem approach to fisheries management (EAF), and to enable targeting of entities that require support.

The offshore small-scale fishers on the other hand operate in small but highly modernized fishing craft, generally about 20 meters overall length (OAL), from sites of concentration including fishery harbors and anchorages. Their evolution has been driven by government policy combined with development assistance and international investment. Sometimes, they target high value inshore species such as shrimps with direct links to coastal ecology, but more commonly oceanic fish species that have limited relationship with coastal landforms and habitats. These operations employ laborers drawn mainly from traditional small-scale fisheries, whose wellbeing requires improvement. The operations of offshore small-scale fisheries, if unregulated, have adverse implications for inshore coastal fishery stocks. Their interest is mainly in export markets, with partial contribution to local nutrition and food security.

Box 10. Characterization of small-scale fisheries (Staples et al., 2004)

“Small-scale fisheries can be broadly characterized as a dynamic and evolving sub-sector of fisheries employing labour-intensive harvesting, processing and distribution technologies to exploit marine and inland water fishery resources. The activities of this sub-sector, conducted full-time or part-time, or just seasonally, are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. Export-oriented production, however, has increased in many small-scale fisheries during the last one to two decades because of greater market integration and globalization. While typically men are engaged in fishing and women in fish processing and marketing, women are also known to engage in near shore harvesting activities and men are known to engage in fish marketing and distribution. Other ancillary activities such as net-making, boat-building, engine repair and maintenance, etc. can provide additional fishery-related employment and income opportunities in marine and inland fishing communities. Small-scale fisheries operate at widely differing organizational levels ranging from self-employed single operators through informal micro-enterprises to formal sector businesses. This sub-sector, therefore, is not homogenous within and across countries and regions and attention to this fact is warranted when formulating strategies and policies for enhancing its contribution to food security and poverty alleviation.”
3.3.2 Hidden relationships: Shared Resource Systems and Livelihood Implications

Significant interactions exist between fisheries such as shrimp trawling in Bangladesh and in India and traditional coastal fisher livelihood (Pramod, 2010). These are the aspects that impart complexity and induce unintended consequences (see Introduction, Section 1.7). These interactions are based on sharing of resource systems between more efficient and less efficient harvesting technologies. Some aspects in summary are:

- **Bangladesh and India are countries with extensive continental shelf areas (Table 7)** where much of the small-scale fishery production occurs. Considerable overlap appears to occur in the shelf areas as well as species composition of catches of the traditional small-scale fishers and modernized shrimp trawling.

- **The demand for shrimp is driving the expansion of trawling.** Hilborn (2007) argues that expansion of coastal shrimp populations and their fishery are a logical ecological consequence as predator populations decrease by way of overfishing. Bhathal (2005) studied historical trends and showed that fishing down the food chain is evident in India.

- **In India, Pramod (2010) presents evidence to show an estimate of the quantity of discards (at sea) from increased shrimp trawling in West Bengal, Orissa, Andhra Pradesh and Tamil Nadu exceeds 600,000 tons / year.** The catches of traditional small-scale fishers in these states are falling. The relationship between the composition of discards and the species generally harvested in the traditional small-scale fishery is not known. Does this situation represent rent dissipation?

- **Bangladesh plans to expand commercial fishing in the coastal areas, including shrimp trawling.** The consequences for the coastal small-scale fishers require understanding.
• Competing land uses in Indian coastal areas are resulting in increasing concentration of fisher populations as fishing areas diminish. Some fishers are forced to migrate to other states to provide ‘fishery labor’ (Pramod, 2010). The interactions within small-scale fisheries appear to increase vulnerability of the marginalized fishing communities.
• Maldives does not have a continental shelf where shrimp trawling may occur. Its small-scale fishery is almost exclusively offshore.
• Sri Lanka’s continental shelf ranks very low in productivity (Swan, 1983; IUCN, 2009). Shrimp trawling in some areas is governed by traditional CBFM. Shrimp fishing does not include modernized shrimp trawling as in India. Since modernization began, catches of traditional coastal fisheries have diminished (Marga, 1981). This is a reflection of the ‘law of unintended consequences’ (see Introduction, Section 1.7) where modern craft and gear intended to boost total fishery production undermines an existing layer of fish capture.

3.3.3 Mapping fishing areas on continental shelves
Management of shared resources on continental shelves in Bangladesh and in India within a framework of CBICM would require maps supported by technical information pertaining to the extents of bottom geomorphologies and overlap in catch compositions among the fisheries that apply technologies of different efficiency. Bangladesh has already made advances in this regard (Figure 14). At present, fishery management zones are demarcated on the basis of distance from shore. The need to improve this approach to further consolidate EAF is shown in the scientific study of Garces et al. (2006). They conclude:

“... there would be substantial benefit in further regional analyses of assemblage structure, using the available scientific trawl survey data and related information. These should focus on: (1) local and regional changes in assemblages through time to determine temporal stability and examine the impact of anthropogenic effects, particularly fishing (e.g. the work of Pauly, 1988; Suvavepun, 1991); (2) using the spatial assemblage patterns in the construction and articulation of spatially-explicit ecosystem models and tools to describe their functioning and likely responses to changes in fishing pressure; (3) provision of scientific insights to assist in the management of marine resources and biodiversity conservation including identifying conservation areas for species or stocks based on their spatial distribution and abundances, e.g. site selection of marine protected areas or fish sanctuaries.” (Garces et al., 2006).

Bangladesh
Advances in mainstreaming co-management include developing new legislation to accommodate co-management, and a new policy to promote community-based management and the involvement of stakeholders, especially women. The lease-based system has largely been replaced by community ownership. The emphasis is on human capacity building and a focus on environment-friendly management to ensure sustainability and conserve biodiversity. Achievements include better community-based fisheries management, better linkages with government organizations (GOs), non-
governmental organizations (NGOs), improved livelihoods, increased incomes of women. Bangladesh continues to cooperate with international and regional organizations and encourages their support.

**Potential for Expansion**

The only industrial fishing developed in Bangladesh operates out of Chittagong on the east coast. It targets mainly shrimp resources. The artisanal fishery (including motorized boats) contributes over 90 percent of the total landing. Khatum et al. (2005) conclude that the potential revenue from the marine fisheries sector could be increased through the implementation of a proper management regime to ensure that the substantial potential within the sector is exploited on a sustainable basis. This would benefit a large segment of the population whose livelihoods are dependent on fisheries production.

**IUU Fishing**

Available information reveals that the Bangladesh EEZ is subjected to IUU fisheries both from domestic and foreign fishing vessels. Khatum et al. (2005) argue that Bangladesh needs to strengthen its monitoring, control and surveillance capacity in its territorial water with a view to stopping IUU fishing as these affect sustainability.

**Fish Export Trade**

The fisheries export includes frozen shrimp and fish. These products together comprise about 83 percent of the country’s total export in quantity terms, and 88 percent in value terms. During the period (2000-06), the total export of various fish and fish products to the European Union (EU) increased nearly two-fold from 16,192 tons to 31,477 tons. Planners envisage future growth in exports to the EU.

**India**

The fisheries sector is an important resource for socio-economic development. In 2005, more than 3.51 million people were involved in the industry. A number of statistics on the Indian fishing fleet were presented. The challenge of maritime safety when dealing with large numbers of small-scale vessels was discussed. A national level review committee was constituted in 1997. The use of zonation in coastal waters for regulation of fisheries is successfully used. The Government of India has, together with BOBP-IGO, implemented a number of very useful projects related to improving the fisheries sector.

The Ministry of Agriculture, in 2001 estimated the potential yield from the marine waters (EEZ) to be about 3.92 million tons (Fishery Survey of India (FSI), 2001, 2009. [http://www.fsi.gov.in/LATEST-WB-SITE/fsi-res-surv-frm.htm](http://www.fsi.gov.in/LATEST-WB-SITE/fsi-res-surv-frm.htm)). The major share of resources lies within 0-50m depth. Time-series catch composition of marine fishery shows considerable variation through the period 1950-2006. These changes are: (1) increase in number of species harvested, (2) changes in catch composition, and (3) decline in population of some species. Broadly speaking, during the 1950s and 1960s, Indian oil sardines, shrimp, mackerels and Bombay duck constituted the majority (more than 1/3rd) of the landings. Since 1970s, the share of Bombay duck in catch composition has declined steadily together with other dominant species such as clupeids and hair tails. On the other hand a phenomenal rise in landing of shrimps and other marine crustaceans took place during the same period. Bhathal (2005) presents evidence of fishing down the food chain from a historical analysis of India’s marine fish catches. Recent studies are revealing that the increase in shrimp production from trawling for export has been achieved with a very high cost in the form of discards. Davies et al., (2009) argue that the total discards would be about 600,000 tons. Pramod (2010), in a country-wide study, estimates the quantity of discards to be in excess of 1 million tons/year. Of this quantity, almost 50% discards (i.e. 537,088 tons) occur from shrimp trawling in the BOBLME-SA (Viz. West Bengal – 4,440 tons; Orissa – 99,247 tons; Andhra Pradesh – 207,232 tons; Tamil Nadu – 212,969 tons; Andaman and Nicobar Islands- 13,200 tons).
Pramod (2010) reported that displacement of small-scale fishers all along the mainland coast has increased during the last decade due to industrial development, pollution, formation of new dead zones (where fishers could no longer catch fish largely due to dumping of sewage and industrial wastes near major cities). To compensate for decreasing catches, the small-scale fishers are compelled to increase effort, with the inevitable consequence of lower catch per unit effort (CPUE) and real losses. Another noticeable change that has reduced income from small-scale fishers was that more crew work on each vessel, so profit from each trip is reduced. The bulk of revenue from a trip is paid to the agents who fund the fishing trips, fuel costs and fishing gear. Incomes have declined for fishermen in all coastal states, as fishers now earn half the amount of money that they earned 10 years back, and thus unable to offset increases in coast of living.

**Potential for Expansion**

The Fishery Survey of India (2006) reported substantial scope for expansion of production by increasing fishing capacity in the offshore waters. The major fishing activities now are concentrated in areas within the 0 to 50 meter depth zone.

**IUU Fishing**

Pramod (2010) reported IUU fishing on various scales in the EEZ. It is more frequent in Andhra Pradesh, Orissa and West Bengal, and probably under-reported for Andaman Nicobar UT given the proximity to Myanmar and Thailand. The Indian Coast Guard is primarily responsible for monitoring of the EEZ. Since its inception in 1978, the Coast Guard has apprehended over 1,200 fishing vessels belonging to nine Asian countries for violation of the Maritime Zones of India. Since the Marine Fisheries Regulation Acts were enacted by the coastal state/Union Territory Governments, the Coast Guard is not authorized to undertake MCS function in the territorial waters.

**Export Trade**

During the period (2000-06), the total export of various fish and fish products from India to the EU alone has increased more than two-fold from 69,015 tons to 142,736 tons. It is emerging as an important and growing market for India.

**Maldives**

A position presentation did not occur at the APFIC meeting, as the Maldives are not an APFIC Member country.

**Potential for Expansion**

The total fishery production in Maldives, almost entirely tuna, has increased about six fold from 30,000 tons in the 1980s to 184,000 tons in 2006 by way of modernization. Almost the entire national catch comes from within a radius of 75 miles of the islands, an area reserved for the local fishers. The EEZ (beyond the Coastal Fishery Zone) contributes only 2 percent of the catch (2007), which largely comprises yellow fin tuna. Further expansion is envisaged.

**IUU Fishing**

Monitoring, control and surveillance (MCS) in the Maldives is carried out by many institutions. Between 2000 and 2008 Maldives apprehended 28 foreign fishing vessels both from neighboring countries and distant water fishing nations (or vessels flying flags of convenience).

**Export Trade**

About two thirds of the catch is exported in canned, fresh/chilled, frozen, dried, and other forms. The total export earnings in recent years were in excess of US$ 100 million.
Sri Lanka

Improved management of fisheries includes more legal actions against illegal fishers and prohibition of some gears in some areas. Mesh size regulation has also been introduced in inland fisheries. Longline technology is also being encouraged. Fisheries management areas have been declared and closed areas/seasons introduced to protect juvenile areas. Alternative income activities are also being introduced. Improved post-harvest fish handling on vessels and in harbors have been encouraged also, including training programmes to improve food quality, e.g. training on Hazard Analysis and Critical Control Point (HACCP). However, many problems are still present and increased efforts are needed.

Potential for Expansion

Among the marine fisheries sub-sectors, coastal fishery contributes nearly 65 percent of the total fish landing in the country. The off-shore and deep sea fishing is steadily emerging as an important contributor to the total fish production (Table 8). The share of this sector (off-shore & deep sea fishing) in total marine production has increased from 8 percent in 1990 to about 30 percent in 2008. The number of fishing vessels has also increased from a total of 31,619 in 2004 to 42,678 in 2007. Further expansion is envisaged.

IUU Fishing

The fisheries legislation, while adequate in terms of addressing local and foreign fishing within the EEZ, does not provide effectively for high seas fishing – which is a major problem area for controlling IUU fishing.

Fish Export Trade

The fisheries export of Sri Lanka (2000-2006) mainly comprises frozen shrimps and fish (including yellow fin tuna). During this period, the total export of various fish and fish products from Sri Lanka to the EU increased nearly four-fold from 2,158 tons to 9,278 tons and presently (2008) stands at 13,816 tons. The government provides support for export growth.

Table 8. Expanding operating range of traditional small-scale multi day boats in Sri Lanka (Amarasinghe, 2001).

<table>
<thead>
<tr>
<th>Area of Operation</th>
<th>Type of Craft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka's EEZ</td>
<td>32-34 ft</td>
</tr>
<tr>
<td>Sri Lanka's EEZ</td>
<td>34-36 ft</td>
</tr>
<tr>
<td>Sri Lanka's EEZ</td>
<td>36-39 ft</td>
</tr>
<tr>
<td>Sri Lanka's EEZ</td>
<td>&gt;40 ft</td>
</tr>
<tr>
<td>International Waters and the territorial waters of Andaman Islands, Nicobar Islands, Maldives Islands, Lakshadweep Islands, Australian Islands, Bangladesh, Thailand and Madagascar.</td>
<td></td>
</tr>
<tr>
<td>Duration of Fishing Trips</td>
<td>1 week</td>
</tr>
</tbody>
</table>

3.5 International Discourse on Marine Fisheries and Implications for Small Scale Fisheries and Poverty in the BOBLME-SA

Recent syntheses of the global status of traditional small scale fisheries are instructive for enriching the framework for assessing case studies from the BOBLME-SA. Worm at al. (2009) recognize that rebuilding small scale fisheries in developing countries is a significant challenge where most fishers do not have access to alternative sources of food, income and employment. To meet the challenge development planning in the BOBLME-SA must first look at how this situation came to be in order to avoid repetition of past mistakes and to learn from existing good practices (see Introduction, Section
Main events:

- Following the peaking of production in industrialized countries in the 1970s, the fishery interests spilled over into tropical waters of developing countries (Alder and Sumaila, 2004).

- The 200 nautical mile EEZ came into operation in the 1980s but did not lead to improvement of the gradually degrading status of world fisheries. "Rather lured by the promise of marine riches which were now “theirs”, most countries, developed and developing alike, encouraged through massive subsidization schemes the development of their fisheries” Pauly (2008).

- Both developed and developing countries alike increased capacity by way of massive subsidies to motorized fishing fleets, some of which continued to be small-scale as in the BOBLME-SA.

- The biomass of large fish traditionally targeted by fisheries reduced to a tenth or less of the level it had at the onset of industrial fishing.

- Seafood now flows increasingly from developing to developed countries, resulting in reduced supplies in protein-deficient, developing countries.

- An increasing fraction of the world’s forage fish are being diverted to feed carnivorous farmed fish such as salmon, groupers and tuna.

Phenomena masking the crisis:

- Since the 1980s China has been massively over-reporting fish catches to the FAO database.

- Decreasing catches from fisheries are pooled with increasing production from aquaculture in the FAO database at the highest level of aggregation.

- Seafood demand in developed countries is being increasingly met by imports from developing countries.

- Governments-affiliated scientists assert that fisheries are fine by ignoring contradictory evidence.

Remedies:

- Expansion of MPAs, predictable access rights, eco-labeling to enable consumers to buy fish from sustainable fisheries for which validation as a market-based instrument is required (Jacquet and Pauly, 2008), and abolition of subsidies.

The highly instructive expert analyses and opinions suggest the complexity of the way forward toward improved marine fishery management. Some of the premises need careful examination in the context of developing countries. Pitcher and Lam (2010) provide a summary of the contradictions that emerge when the ten most common management approaches are considered (Table 9). Additionally the form of consciousness that prevailed of marine resources when fishery modernization began was based upon the simple application of technology toward efficient harvesting of an unlimited stock of fish. The complexity of the coastal and marine environment was inadequately understood – hence the unintended consequences of fishery development.
(Introduction, Section 1.7). The challenge is the applicability of these management solutions in the context of the complex dimensions of poverty in Bangladesh, India and in Sri Lanka where the imperative is growth in all primary production sectors. In the Maldives the contribution of fisheries to employment has diminished from 17% at the beginning of the decade to 9% in 2006. This is because jobs in the rapidly growing tourism sector provide attractive alternative job opportunities.

Table 9. The ten commonly advocated fishery management solutions and the associated logical and scientific contradictions that reveal their inadequacies if applied alone and piecemeal (Pitcher and Lam, 2010). The primary reference (Pitcher and Lam, 2010) is accessible online and provides extensive citations relevant to the text in the table. This table includes only indications of contradictions.

<table>
<thead>
<tr>
<th>Fishery Management Solution</th>
<th>Scientific Contradictions and Logical Inadequacies (Pitcher and Lam, 2010 supported by references)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privatization of Resources: e.g. ownership rights such as individual transferable quotas (ITQs). Assumption: ownership promotes stewardship.</td>
<td>Assumption is a fallacy, only access rights are provided within a total allowable catch (TAC), and not ‘ownership of the resource’. In Iceland, economic efficiency increased as initially allocated ITQs became concentrated into larger firms. The ‘social cost’ was the marginalization of small-scale fisheries and crews.</td>
</tr>
<tr>
<td>Total Economic Valuation (TEV): Assumption: TEV assigns value to fish stocks which exceed market prices. This serves as an economic disincentive.</td>
<td>TEV endows the ecosystem value beyond its marketable landed catch value, but does not value public goods with considerations of ecological sustainability or social equity. As ecosystem goods and services become scarcer and more valuable, they may acquire market values that may compromise the basic needs of the poor while creating opportunities for the rich.</td>
</tr>
<tr>
<td>Laissez faire: Assumption: Management improves when commercial fishery is allowed to manage their own fisheries without government interference.</td>
<td>Private-interest groups with political power, such as commercial fishermen, often influence fisheries management and policy decisions against conservation creating perverse economic incentives notably subsidies. This enables fishery enterprises to fish when it would be otherwise uneconomical if costs and benefits were strictly market determined or ‘internalized’.</td>
</tr>
<tr>
<td>Selective fishing technology: Assumption: Fishing gear selected for regulated species, causing no damage to benthic species etc., will reduce harm to overfished stocks.</td>
<td>Fishing technology has evolved over millennia to increase fish catch, number of target species caught, to travel greater distances to new habitats and greater depths. The effect has been serial depletion of species and fished areas, while fishermen benefit from globalization of markets. Improved fishing technology alone is unlikely to address conservation issues.</td>
</tr>
<tr>
<td>Marine Protected Areas (MPAs): Assumption: Protected areas of ocean where human activities are restricted to conserve biodiversity and hedge against scientific uncertainty.</td>
<td>MPAs are now recognized not as panaceas, but as useful ecosystem-based management tools. Hilborn (2007) asserts absence of scientific evidence. An analysis of compliance of the top 53 fishing nations with MPA provisions of the United Nations’ “Code of Conduct for Responsible Fisheries” awarded only 15% “good,” and over 80% “fail” grades.</td>
</tr>
<tr>
<td>Single species stock assessment: Assumption: Rigorous, modeled data enables catches to be made sustainable.</td>
<td>Single species fisheries science neglects complex multispecies and human interactions. Such stock assessment analyses often miss critical factors in the real fisheries dynamics. The approach requires intensive data for many parameters.</td>
</tr>
<tr>
<td>Ecosystem-based management (EBM): Similar to FAO’s EAF. Assumption: A holistic, approach incorporating the human dimension improves management.</td>
<td>No known cases where EBM (or EAF) has produced the expected benefits. Implementing FAO’s EAF requires simple-to-measure indicators. Even where necessary ecosystem information is available, complex multi-species interactions with multiple stakeholders can inadvertently heighten the exploitation of resources. Evaluation of EBM in 33 top fishing nations revealed dismal results.</td>
</tr>
<tr>
<td>Community-based management (CBM): Assumption: Less overfishing occurs where local ecological knowledge is used.</td>
<td>Traditional socioeconomic systems governed by customary practices and laws reduce some of the environmental damage of large-scale, industrial, mixed-stock fisheries. CBM does not necessarily produce its often-claimed benefits including more equitable distributions of power, economic returns and sustainable use.</td>
</tr>
<tr>
<td>Traditional ecological knowledge (TEK): Assumption: Incorporating traditional knowledge imparts sustainability</td>
<td>TEK can be profound, but the more diverse and numerous the stakeholders, the more challenging the management and governance. Lack of cross-cultural understanding often arises from differing cultural values of natural resources.</td>
</tr>
<tr>
<td>Historically based restoration: Assumption: Reversing to an earlier ecosystem state enables sustainability</td>
<td>Could this be a naturalistic fallacy? From a more realistic and complex perspective, this strategy is a composite of many of the previously discussed instruments. Lessons from history reveal that fisheries were seriously depleted.</td>
</tr>
</tbody>
</table>

Pitcher and Lam (2010) conclude that the trade-offs among the ten common fishery management strategies need to be understood with care to arrive at a composite policy approach. They state that “Aspects of all ten fisheries management strategies will likely need to be implemented, but none alone is sufficient to avert the growing global fisheries and looming food crises. The historical
imperative tells us what happened in the past and helps us decide what we want for the future, by informing how we design socioeconomic incentives and policy goals today. Human demands and impacts on the sea are intensifying with global population growth, industrialization, and climate change. By examining historical ecosystems and customary practices and norms, by returning to traditional food sources and community-based management, by considering judicious use of plankton resources in an ecosystem-based context, and by the selective and efficient use of technology, we may intentionally shift global society to a more desirable future. With scientific insight, powered by political will and consumer awareness, we can rebuild fisheries ethically, addressing the basic human right to food while leaving biodiverse marine ecosystems largely intact”.

3.6 Can fishing effort be expanded in the BOBLME-SA EEZs?

The National Reports from BOBLME Stage 1 recognize generally the scope for expansion of fishing effort, by way of improved technology in combination with incentives, monitoring, control and surveillance (MCS). Kurien (2006) argues that incentives may include subsidies. Chang (2002; 2003) uses a historical perspective to demonstrate that subsidies in fisheries that were key to fisheries development and human well-being in coastal communities in industrialized countries may be useful in developing countries. Trade in fishery products has grown since 1961 in a manner where the developing countries contributed 60% to global fish production in 2001. In a context where the EEZs of the BOBLME-SA countries are only utilized partially, intensification of fishing effort through subsidies is perceived as an opportunity (Table 10). However, given the serious shortcomings in the scientific understanding of the state of fishery stocks based on the complex relationships among oceanographic, biological and socio-economic aspects, in the South Asian countries, the perceived opportunity could be misleading. It is precisely the oversimplification of complex fishery environments that has precipitated both the intended and the undesirable, unintended consequences of planned interventions. Therefore, caution is warranted.

Table 10. The divergence in perception of the existing situation in regard to fisheries in the BOBLME-SA based upon prevailing information, and the possible future in relation to the segment of the Bay of Bengal situated outside national jurisdictions, global trade prospects and potential contribution to national development (see text for explanation).

<table>
<thead>
<tr>
<th>BOBLME – SA</th>
<th>Pattern of utilization of resource potential</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50% as EEZs as national jurisdictions</strong></td>
<td><strong>50% situated outside national jurisdiction</strong></td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td><strong>Inshore (%) – on continental shelf</strong></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>98</td>
</tr>
<tr>
<td>India</td>
<td>90</td>
</tr>
<tr>
<td>Maldives</td>
<td>2</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>65</td>
</tr>
</tbody>
</table>

Perception of utilization and management need: overexploited, fishery should be managed, *subsidies to be eliminated* (FAO, 2005a; b), habitats and pollution to be managed.

Reported situation: expanding utilization by distant water fishing fleets from industrialized nations, including IUU (BOBP-IGO, 2009; MRAG, 2008).

Perception of opportunity: offshore exploitation and utilization of resources could be expanded through deep sea fishing, joint ventures etc (Kurien, 2006).

Challenge to BOBLME – SA: benefiting from the available fishery resource opportunity by way of appropriate negotiations at
the WTO, and broadening the equitable distribution of benefits toward livelihood development, particularly poverty (deprivation) reduction, and adaptation to climate change. Minimizing resource competition between modernized shrimp trawling (classified as small-scale fishery) and traditional / artisanal small scale fishery particularly in India (Pramod, 2010).

**Resource Rent in Fisheries (DFID, 2004)**

Resource rent is a key concept in fisheries exploitation and management because on the one hand, it is the driving force behind the widespread overexploitation of fisheries, and on the other, it determines the potential economic and social benefits that may be derived from well managed fisheries. Management systems have typically paid insufficient attention to resource rent, a fact that has been a major reason for the failure of many such systems. Where resource rent is not dealt with explicitly, the incentive for each fisher to attempt to catch fish before others does ensures that such rent is eventually all dissipated - i.e., it is invested in excess fishing capacity leading to over-exploitation in both economic and biological terms (Hardin, 1965). The issue of resource rent is related strongly to access conditions in the fishery. The free and open access nature of many fisheries leads to over-exploitation. Therefore, it raises questions of defining ownership and property and use rights.

Ownership issues, in turn, lead to problems of who is able to ‘charge’ for the use of the resource, who bears the costs of use and who reaps the benefits. Management objectives in a fishery are ultimately of a social and economic character, and their achievement on a sustainable basis requires the explicit consideration of resource rent – its generation and distribution. The achievement of these objectives is subject to constraints, especially ecological sustainability. Because of widespread overexploitation, this latter constraint often features as a policy goal. Policy decisions must be made about how the wealth from the fishery is collected and how that wealth is distributed.

World Bank and FAO (2009) have focused attention on resource rent and its significance in planning for optimal use of fishery resources. The character of common pool resources requires recognition for proper management (Berkes, 2006). Some case studies in Section 2 demonstrate that traditional practices already exist for management of common pool resources.

**3.7 Risk, Exposure and Chronic Disaster**

The relationship of the BOBLME-SA to natural hazards, emerging uncertainties associated with climate change, and the ongoing demographic trends, place coastal populations at increasing risk. This requires recognition in all interventions related to CBICM. Risk is the product of the frequency of hazards and the potential for damage to life and property. Thus, risk increases proportionate to the density of population and property in an exposed area. Accordingly Bangladesh ranks as the most vulnerable country to tropical cyclones based upon deaths/100,000 of population exposed to floods and cyclones (GOB 2008). The impact of the 2004 Indian Ocean Tsunami in India and Sri Lanka demonstrated the higher probability that extreme events destroy life and property of poorer small-scale fishing populations along exposed coasts (Kasperson and Kasperson, 1991; Kelman, 2007; O’Keefe et al., 1976; Sachs, 2005).

In the context of CB-ICM, recognition is required for the distinction between acute and chronic disasters. The former are those to which a date and time may be assigned as in the case of the 2004 Indian Ocean Tsunami. Chronic disasters are those where social and political factors contribute to the gradual concentration of human populations at locations that are unsuitable for secure habitation, and which because of low income cannot invest in housing that adheres to minimum safety standards. The primary driving forces of chronic disaster are poverty and political marginalization (Lemos et al., 2007; Sieh, 2000; 2006). Where acute and chronic disasters combine catastrophe is inevitable as amply demonstrated by the recent 2004 Indian Ocean Tsunami, Cyclone Sidr 2007, and Cyclone Nargis 2008. The latter two conveyed powerful lessons on the need for preparation to secure life and property of poor coastal populations (Box 10).
Box 10. Preparation for Hazards Reduces Loss of Life

Cyclone Sidr hit the south-western coast of Bangladesh in the evening of 15 November 2007 as a category-4 super cyclone with peak winds at 250 kilometers per hour. Approximately 30 of Bangladesh’s 64 districts were affected by the storm. A total of 3,295 people were reported dead and approximately 53,000 people were reported missing. Across 30 districts of Bangladesh, 8.7 million people were affected.

Cyclone Sidr that hit Bangladesh in November 2007 was similar to Cyclone Nargis, the cyclone that has devastated much of Myanmar since 2 May 2008. Yet the impacts from these events are worlds apart – Bangladesh lost 3,000 people while it is estimated that Myanmar will have more than 100,000 deaths. With similar Human Development Index rankings, similar poverty levels and similar annual GDP, the lives and vulnerabilities of communities in Myanmar and Bangladesh living on extensive coastal tributary systems are remarkably alike. Why then did similar cyclone events affecting similar communities result in strikingly different disasters?

The answer: Bangladesh has incorporated early warning systems, mitigation measures and community preparedness activities into its development program, and Myanmar has not. Three key disaster risk reduction measures in Bangladesh are:

1. **Effective early warning systems**: Bangladesh has a 48-hour early warning system that advises people at risk to evacuate to safe cyclone shelters before cyclones make landfall. Myanmar had no early warning system and information was not communicated to communities in danger.

2. **Embankments**: Bangladesh has invested in flood and storm surge embankments in high risk areas. Myanmar has no such structural mitigation.

3. **Preserved mangrove forests**: Bangladesh has worked with key partner development agencies over 10 years to protect the Sundarbans, the world’s largest mangrove system and world heritage site. Myanmar has destroyed its mangrove forest system, losing its natural buffer.

This event demonstrated that size of a hazard event does not matter, since the same-sized cyclone had different impacts in Bangladesh and Myanmar.

4. Retrospection, Conclusions and Recommendations

4.1 Retrospection

Retrospection is warranted before the transition can be made to conclusions from the material presented in the preceding sections. The material was wide-ranging and complex but necessary to bring clarity to the challenge of CB-ICM, or more pointedly, to imparting sustainability to the small-scale fishery in the BOBLME-SA. Retrospection would serve to ensure that the focus and emphasis is retained on livelihood of coastal communities as the core problem. This becomes more meaningful when the problem of livelihood is looked at from an evolutionary standpoint, i.e. the manner in which change has occurred during a period of about five decades since the 1960s. These five decades constitute an appropriate period since it allows a comparison of changes during three distinct stages of fishery development: (i) pre-modernization; (ii) modernization, and (iii) post-modernization coupled with globalization (Kurien, 2003; 2005; Neiland, 2004; Salagrama and Koriya, 2008). The changes brought about by the expansion of adequately serviced modernized small scale fishing fleets, paralleled with the decline in the traditional and partially mechanized small scale fishery livelihood, appear to have occurred in complex and indirect ways associated with geomorphology, policy disjuncture contributing to inequity, and negative externalities (rent dissipation). The questions relevant to the evolutionary change process as demonstrated by the case studies during these three stages are:

1. Why has the wellbeing of traditional and partially mechanized marine small-scale fishers declined from impacts of national fishery development policy, while the intended goal was improved livelihood through modernization?

2. Are there countries in which the wellbeing of small-scale fishers has been deliberately improved by way of appropriate policy?

3. What are the key concepts that have contributed to enhanced wellbeing of small scale fishers where development policy produced the intended result?

4. What are the key ingredients in development economic policies that contribute to or enable the opportunities for enhanced well being of small scale fishers?

5. What conclusions may be warranted with regard to reliability of similar changes during the BOBLME Stage 2 Programme? What key lessons can be drawn from the initiatives in community management, co-management and livelihoods development in the South Asian BOBLME countries? How can the best practices and lessons from these community driven experiences be recognized, further strengthened, adapted /replicated?

Preliminary answers to these questions are provided below. The answers and discussions related to these questions form the basis for the overall conclusions presented in this review and provide important information for further discussion and debate at the regional level and national level. It must be remembered, however, as Arthur C. Clark, one of the greatest minds of our time noted, information is not knowledge, knowledge is not wisdom, and wisdom is not foresight, but information provides the foundation for all others.

The following answers 1-5 follow the sequence of questions as they are presented above:

1. Why has the wellbeing of traditional and partially mechanized marine small scale fishers declined from impacts of national fishery development policy, while the intended goal was improved livelihood through modernization?
The participation of traditional small scale fishers was regarded as a means to an end, i.e. their participation would increase fishery production on a national scale through modernization. The socio-economic wellbeing of the fishers was inadequately regarded as an end in itself in parallel with increased fish production. Benefits of modernization were meant to ‘trickle down’ even in the absence of the necessary enabling mechanisms. Sen (1995; 1999) clarifies the distinction. “Human beings are the agents, beneficiaries and adjudicators of progress, but they also happen to be – directly or indirectly, the primary means of all production. This dual role of human beings provides a rich ground for confusion of ends and means in planning and policy making. Indeed, it can – and frequently does – take the form of focusing on production and prosperity as the essence of progress, treating people as the means through which that productive progress is brought about (rather than seeing the lives of people as the ultimate concern and treating production and prosperity merely as means to those lives)” [http://tek.bke.hu/korok/sen/docs/development.pdf]. Jentoff et al. (2010) argue that Sen’s (1995; 1999) thoughts on freedom, development and poverty require incorporation into perceptions and interpretation of small scale fisheries. During the past most interventions in support of marginalized small scale fishers were driven by aid programmes with governments being bystanders (APFIC, 2005) while artisanal fishers continued to be entrenched in declining fisheries (Cinner et al., 2008). Stiglitz (2002; 2006) has shown that economic growth in its present form neither reduces poverty nor increases human wellbeing unless mechanisms exist to promote equity.

2. Are there countries where the wellbeing of small scale fishers has been deliberately improved by way of appropriate policy?

The following answer must be considered in combination with a caveat – the role of subsidies in the particular examples are not provided as justification for continuation of the same as they now exist, particularly in small scale commercial, and industrial fisheries (Jacquet and Pauly, 2008). The development of fisheries and fishery livelihood in developed countries including Canada, Norway and Iceland during 1930 – 1980 were driven by appropriate national plans, policies and state support. This support included subsidies, both physical and financial, to fishing communities and fish processing plant workers for improvement of the socio-economic conditions and provision of social security arrangements. These state interventions had a significant impact and greatly enhanced the livelihood security of communities dependent on fisheries. The following two examples suffice to make the point that it is possible and feasible for the state to plan fishery development while ensuring the wellbeing of the fishers and fisher communities in parallel with introduction of modern technology to increase production (World Bank, 2006; Kurien, 2006).

In Canada when fishermen incurred losses due to bad weather the government introduced a subsidized vessel insurance plan. When the cod fishery collapsed in 1992, a massive adjustment programme helped individuals and communities to adjust out of the fishery, largely through training, retirement and license buyback programmes that were introduced (Schrank, 2003).

In Norway, the natural fluctuation of the northern fishery led to hard times for fishermen. As early as 1933, the government established a fisheries bank, and provided loans at beneficial rates and even sometimes interest free in emergencies. A health insurance scheme was introduced in 1936. Between 1959 and 1964, based on a Master Agreement for the Fishing Industry, several livelihood security measures were adopted. These included wage equalization measures, vacation support, unemployment insurance, damage compensation among others. These subsidies were eliminated in the mid-1990s after the coastal communities achieved a standard of living on par with that of the average industrial worker (Schrank, 2003).

3. What are the key concepts that have contributed to enhanced wellbeing of small scale fishers where development policy produced the intended result?

The key conceptual factors that can be considered to have contributed to enhanced wellbeing of small scale fishers include:
i. Development planning in fisheries inclusive of interventions targeting the small scale fishers as beneficiaries; and
ii. Capacity development 'to adjust out of the fishery' when fishery stocks diminish, or the provision of livelihood resilience independently of fluctuations in natural stocks and growth in coastal human populations.

Targeted interventions have to be underpinned by policies that ensure equity in distribution (World Bank, 2006), and acknowledging ‘development as freedom’ explained in greater detail in Section 2 of this report (Sen, 1995; 1999).

4. What are the key ingredients in development economic policies that contribute to or enable the opportunities for enhanced well being of small scale fishers?

The key development economic policies that contribute to or enable the opportunities for enhanced well being of small scale fishers can be regarded as:

i. A law and order situation which guarantees property safeguards and the application of resource rents that prevent rent capture by politically oriented interests at the expense of the small scale fishers (World Bank / FAO, 2009; Commission on Legal Empowerment of the Poor, 2008)

ii. Organization of small scale fishers, their empowerment and awareness building leading to adequate public pressure that compels legislators to react (Jacquet and Pauly, 2008; Kurien 2005; Chomsky 1999).

5. What conclusions may be warranted with regard to reliability of similar changes during the BOBLME Stage 2 Programme?

Public policy with regard to small-scale fisheries cannot remain to be the sole domain of political authorities. In the absence of public pressure based on awareness (from small-scale fishery stakeholders) there is insufficient reason, motivation or incentive for policy changes to be made on the basis of scientific evidence alone, since the ‘junk science’ label may be fixed on even the best scientific evidence if elite interests are challenged (Ben-Yami, 2004; Chomsky, 1999; Herman, 2003; Hilborn, 2007; Pauly, 2005). Science can only provide the knowledge foundation for political activism. The necessary changes could result from data gathering, training, capacity building which would result in empowerment, organization and advocacy leading to compelling public pressure such that legislators react in a manner that narrows the existing institutional and governance distance between government and small scale fishery interests.

McClanahan et al., 2009, researching fishery exploitation systems as social-ecological systems (SESs), encourage the promotion of social institutions. They assert that socio-economic development of coastal communities must take precedence over ‘biodiversity-based’ conservation efforts. Facilitating development and catalyzing local-level adoption of rules that create limits to appropriation and technology, since it is increasingly recognized that such limits are key solutions to the threats could serve both socio-economic and conservation interests. They predict that addressing the four priorities given below would also provide benefits in relation to management of biodiversity and ecosystem services. This will be achieved if policy and actions:

1. Encourage professionalism (formation of ‘societies’, setting standards, certification, self-policing, appropriate technology, etc.),
2. Create forums where all opinions about solutions, the status of targeted species, and environmental requirements are represented,
3. Promote social rules that consider the realities and limits of the households and local social economy, and
4. Craft solutions tailored to the specific and agreed upon diagnoses.

4.2. Conclusions
The conclusions are drawn from the case studies in relation to the FAO Vision for Small-scale Fisheries (Staples et al., 2004), the ‘fisheries sustainability framework model’ (Greboval, 2002; Swan and Greboval, 2003) and the APFIC recommendations for mainstreaming traditional small-scale fisheries management, the global perspective, and field experience of the consultant. The preceding retrospective serves to provide reference for the conclusions in terms of indicating possibilities for the future. These conclusions, initially developed for discussion at the BOBLME-SA Workshop, 28-29 July 2010 in Colombo, were revised on the basis of recommendations put forward by the country delegations.

1. Economic growth is necessary to reduce poverty at the national level. Currently the process and trends of economic growth are marginalizing traditional fishers because of cultural factors, because of the absence of opportunities from which this sector of fishers can benefit, and the absence of policy that is designed to provide equitable development. Integrated coastal development planning is necessary to ensure equitable sharing of benefits from coastal resources. In the absence of a mechanism for integration of traditional fishers this resource user group continues to be marginalized despite their significant contribution to food security.

2. Community Based Integrated Coastal Management (CB-ICM) which implies the integration of coastal resources management and fisheries management within FAO’s Ecosystem Approach to Fisheries (EAF) does not exist in the BOBLME since Integrated Coastal Management (ICM) is not practiced uniformly.

3. CB-ICM with stewardship of local communities is adequate where the ecological system and competing uses are limited. Where the geographic scale of the ecological system and uses increase, partnership with the government becomes necessary in order to resolve resource use conflicts.

4. A variety of different approaches to coastal resources management exist in the four BOBLME-SA countries; Bangladesh, India, Maldives and Sri Lanka. The different approaches to coastal resources management are based upon:
   - Bangladesh – an intersectoral collaborative development process without a declared legal coastal zone
   - India – a land use regulation process (which is in process of transition since the coastal regulatory zone is being revised).
   - Maldives – In the absence of a continental shelf of the form that exists in the other three countries, a coastal fisheries zone has been declared as the operational area.
   - Sri Lanka – a narrow legal coastal belt encompassing both land and sea which partially overlaps with the fishery management jurisdiction

5. The examples of CB-FM and Co-management analyzed in the review (except the fishery cooperatives) embody limitations of access in various forms. This is the precondition for sustainability of fisheries. The strengthening of existing management mechanisms through co-management will consolidate sustainability.

6. The coastal resources management processes are not integrated with the land uses that cause negative externalities (e.g. land based sources of pollution) as required in FAO’s EAF.

7. Overfishing is evident from applicable indicators in the near shore coastal waters of Bangladesh, India and Sri Lanka which has adverse impacts on the livelihood interests of traditional mechanized and non-mechanized fishers.
8. Fishery modernization has resulted in increased production which has disproportionately benefitted the external investors in production and marketing rather than the traditional producers. This process of change may continue unless livelihood safeguards are available to the marginalized traditional producers. Fishery modernization has also lead to the transformation of the role of fishers from producers to laborers and the marginalization of women in the supply chain.

9. Lack of development policy that supports the interests of traditional mechanized and non-mechanized fishers has resulted in the marginalization of this sector through the lack of their representation in development decision making processes. The existing trends suggest that traditional fishers shall continue to be marginalized unless deliberate policy choices are made to reverse this pattern.

10. The existence of property rights (informal and/or formal) alone does not guarantee a reversal in these trends. In spite of the existence of CB-FM and co-management practices the vast majority of traditional fishers lack recognition and have become marginalized:

   • In terms of opportunities for acquiring economic benefits from coastal resources proportionate to the services they provide in terms of food security and the local and national economies.
   • In terms of their capacity to participate in the processes of decision making that affect the health of coastal resources (land competition, pollution from land uses, biodiversity conservation/protected areas management)
   • Because of their lack of identity anchored to geographic locations of habitation and resource use; small scale fishers are not "on the map" or currently recognized. There is very little information on their distribution and their patterns of resource use.

11. The livelihood problem associated with traditional fisheries is massive and looming in terms of socio-economics, and in the face of increasing risk from coastal hazards linked to climate change and sea level rise. This problem has to be addressed firmly and steadfastly by way of:

   • education,
   • health,
   • infrastructure for life and security,
   • empowerment including women, marginalized groups, and
   • access to upward social mobility.

12. Many marginalized coastal/fisher communities are in a chronic poverty trap which results in progressive increase in their level of deprivation (creeping normalcy). This requires recognition at the national level as a chronic disaster which may combine with acute coastal hazards (those to which a time and date can be given) resulting in catastrophes.

13. The remote and dispersed nature of coastal/fisher communities/settlements which are inadequately serviced with infrastructure has obstructed movement into other occupations i.e. poor access to education, health, alternative employment opportunities etc.

14. High levels of income poverty and lack of access to alternative means of income have caused displacement and transfer of responsibility for family health and nutrition to women heads of households. This is particularly the case in Bangladesh and in some of the Indian states.
15. In the context of national development expansion of fisheries into offshore waters within EEZs is perceived as an approach to benefitting from global fishery trade. The process of expansion is either being planned or it is already occurring. The expansion into offshore waters and export oriented coastal fishery production measures may be warranted, if supported by scientific stock information, to safeguard the ecological structure of near shore coastal waters on which traditional coastal fisheries depend. A precautionary approach is required.

16. If fishery development is planned and implemented as it has occurred during the past five decades, i.e. without adequately understanding the complexity of the particular socio-ecological systems, undesirable unintended consequences will be inevitable with the severest socio-economic impacts being borne by the weakest actors in the sector.
4.3 Recommendations

1. CB-FM and co-management practices exist in traditional fishing communities at different geographic and institutional scales. These practices operate on a basis of informal and formal limitations of access, sets of rules that have developed to support institutional cohesion, consultative decision making and livelihood safeguards for participating households. Despite the impacts of fishery modernization and economic growth in the fisheries sector these practices have demonstrated resilience.

A policy-based strengthening of existing CB-FM and co-management practices is necessary for the realization of the potential for these practices to support sustainable livelihood for coastal/fisher communities.

2. The process of change in coastal resource use results from a sharing of resources among many sectors and needs to be planned. In development planning there is a need to create equitable opportunity for traditional fishers to benefit. Appropriate governance with participatory decision making is required to minimize conflict and ensure equity in benefits sharing for all stakeholders.

In this respect coastal planning needs to recognize all ‘players’ in order to maximize opportunities for intersectoral cooperation and to avoid the erosion of traditional land uses and livelihood. The management of the near shore fisheries is an important aspect of Integrated Coastal Management (ICM) and requires the engagement of fishers to participate in the planning and decision making processes as equal partners. Enabling mechanisms are required e.g. integrated planning processes, local capacity building to respond to opportunities.

3. It is important to take measures to consolidate and safeguard existing CB-FM and co-management practices (whether formal or informal) to ensure that they become effective even in the absence of fully fledged national ICM mechanisms/policy. This must be a priority. It is feasible to anticipate that the political (group) demand for ICM would emerge from the stakeholders currently participating in CB-FM and co-management processes as they become knowledgeable about the ecosystem approach to fisheries management (EAF). A number of practical steps can be taken to consolidate and strengthen existing CB-FM and co-management practices;

i. Workshops that build awareness and knowledge may contribute to the acceleration of CB-ICM.

ii. Research to define social ecological systems that demonstrate CB-FM and co-management. Research would incorporate four fundamental attributes: (i) the resource system and its ecological linkages,(ii) the number of resource units generated by the resource system, (iii) the number of resource users and (iv) the institutions that support management.

Mapping processes that recognize and document the nature of existing CB-FM and co-management practices in Bangladesh, India and Sri Lanka are critical steps towards establishing a foundation for sustainable resource management. Such mapping (which would include information on fishing areas, distance from the shore, bathymetry and sea bed
features) will result in the allocation of a geospatial identity for the traditional fisheries sector. This is an essential first step towards empowerment.

National policy reforms are required for mapping the distribution and resource use patterns of coastal resources by the traditional mechanized and non-mechanized fisheries sector.

iii. Socio-ecological entities (groups and organizations) empowered by knowledge of the system attributes provide a step toward the development of networks and federations that then have the subsequent ability to acquire political power.

iv. Economic valuation of the contribution by traditional fisheries (to employment, nutrition/food security, gender aspects etc.) needs to be researched and demonstrated to national policy makers. Demonstrating economic contribution of CB-FM and co-management practices to the local and regional economies in terms of food security and employment would be persuasive for the state to support dedicated policy promoting co-management practices and to bear the transaction costs of formalizing co-management.

The technical information that is required for economic valuation of existing CB-FM and co-management are; (i) the resource system and its ecological linkages, (ii) the number of resource units generated by the resource system, (iii) the number of resource users and (iv) the institutions that support management.

v. In the Maldives consolidation of existing co-management in the coastal fisheries zone requires safeguards against IUU fishing and other forms of fishing driven by vested interests such as ‘industrial fishing’.

4. Reversal of the marginalization of traditional mechanized and non-mechanized fisheries requires the recognition of traditional fishers as a sub-sector in its own right and the targeting of initiatives that will support their needs and interests. The key steps towards achieving this include:

(i) providing geospatial identity to each entity which embodies CB-FM and (informal) co-management. (ii) policy reforms that target these recognized geospatial entities. (iii) zonation that accommodates co-existence of such entities alongside other competition for resource use and space (iv) monitoring and enforcement of regulations.

5. Regulations are required to provide territorial use rights in fisheries (TURFs) to stakeholders who are participating in CB-FM and co-management. Local understanding of legislation governing resource management is an essential underpinning for this to take place because regulations pertaining to fisheries and to coastal resources management fall within ambits of many agencies. This requires support through collaboration among responsible government agencies both at the national and local level.

6. Improving livelihoods: Initiation of processes for the provision of identity to migratory households/groups located in remote areas. This is important since many of them do not have permanent addresses. This is particularly important for itinerant or migratory groups that are
mobile in order to bring them into poverty reduction support programmes. National programmes are now underway for poverty reduction in the context of Poverty Reduction Strategy Papers (PRSPs) and other similar interventions. Transfers of benefits can occur to marginalized fisher communities only to the extent that they can be identified. The practical recommendation is the mobilization of NGOs to achieve this task.

7. Capacity development to enable communities to access services provided by micro-finance institutions is a key practical step which can allow households and community groups the option to diversify livelihood/ income generating opportunities. This can become the basis of voluntary cooperative development as a process that has the potential to offer significant positive change for community groups through economic and political empowerment.

8. The potential for public-private partnerships between coastal tourism investors and fishing communities. There is a mutually beneficial relationship between the two sectors, the public right of fishing communities to access the sea and the cultural interest factor for tourism that fishing communities bring. It is government policy that enables or ensures whether this kind of co-existence has the potential to thrive.

9. Global/ export demand for aquaculture products can lead to land capture by investors and the marginalization of traditional inhabitants, often fisher communities. Therefore policies that promote expansion of aquaculture must be designed with institutionalized mechanisms for equitable distribution of benefits included.

10. The design and implementation of protected areas should be done in a participatory manner and be based upon considerations of access for traditional fishers to the fisheries.

11. Microfinance/ microcredit interventions are demonstrating effectiveness for providing financial support for alternative employment and diversification of livelihood. The initiatives of NGOs have acquired support from government and banks because of proven effectiveness. Many traditional fishing communities lack capacity to access such financial programmes because of inadequate training and/ or education. Measures need to be in place to prevent exploitation of credit recipients from usurious interest and to protect them from unscrupulous MFIs.

12. Inventories are need to be developed for members of fisher households who are now employed in other countries and send back remittances. This class of foreign exchange remitters are now acquiring recognition as a significant contributor of foreign exchange, that even exceeds foreign direct investment (FDI). Such remitters require organization as a class to lobby and negotiate health and education investments in their own communities.
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Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are working together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project and to lay the foundations for a coordinated programme of action designed to improve the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

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