

**ADVISORY COMMITTEE ON FISHERIES RESEARCH**

**Papers presented at the**

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**SECOND SESSION OF THE WORKING PARTY ON  
SMALL-SCALE FISHERIES**

**Bangkok, Thailand, 18–21 November 2003**



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## PREPARATION OF THIS DOCUMENT

This document contains the papers submitted by the FAO Secretariat and delegates to the second session of the Working Party on Small-scale Fisheries of the Advisory Committee on Fisheries Research (ACFR), held in Bangkok, Thailand, from 18 to 21 November 2003. The meeting was jointly organized by the International Institutions and Liaison Service (FIPL) of the Fisheries Department in FAO headquarters and by the Regional Office for Asia and the Pacific (RAP) in Bangkok. The views expressed in these papers are those of the author(s) and should not be attributed to their organizations.

The Report of the Working Party on Small-scale Fisheries of the Advisory Committee on Fisheries Research (ACFR) has been published as FAO Fisheries Report No. 735. The report is also available on the FAO Website.

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### ABSTRACT

At the fourth session of the FAO Advisory Committee on Fisheries Research (ACFR), in December 2002, the Committee highlighted that small-scale fisheries had not received the research attention that they deserved considering the important contribution that they make to nutrition, food security, sustainable livelihoods and poverty alleviation, especially in developing countries. The Committee pointed out that although many of the issues such as user-rights, excess capacity, illegal, unreported and unregulated fishing, trade and incentives, governance, etc. are common across all fisheries, they need explicit attention in the small-scale fisheries (SSF) context. The Committee recommended that a working party be convened to elaborate a draft research agenda and undertake an evaluation of the role and importance of small-scale (marine) fisheries and outline ways in which the transition to responsible fisheries could be facilitated, bearing in mind the developing paradigm of Ecosystem Approach to Fisheries (EAF). The scope was later extended within the FAO Fisheries Department to also include estuarine and inland water capture fisheries.

The Working Party held its meeting in Bangkok, Thailand, from 18 to 21 November 2003. This document contains the eight papers submitted to the Working Party. The papers highlight main research themes that should be considered in formulating a draft research agenda for small-scale fisheries. These themes include policy legislation governance and institutional arrangements; contribution, relevance and importance of small-scale fisheries to national economies and livelihood; management approaches to small-scale fisheries; post-harvest issues and trade; information systems for small-scale fisheries, and also emphasize strategies and mechanisms to bridge the gap between research and action. Drawing on the output of the Working Party and the papers in this document, two separate documents, a draft research agenda for small-scale fisheries and contribution, role and importance of small-scale fisheries are in preparation.

### Distribution:

Participants  
ACFR Members  
FAO Fisheries Officers, Regional and Subregional Offices



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## LIST OF ACRONYMS AND ABBREVIATIONS

ACFR	Advisory Committee on Fisheries Research
ACP	African, Caribbean and Pacific Group of States
ADAMAM	Association pour le développement des activités de mareyage de Mboa-Manga (Cameroun)
ADF	African Development Foundation
ADS	Agence pour le développement social
AFCOD	West/North-West Artisanal Fisheries and Community Development Project
AMED	Approche pour des moyens d'existence durables
APCAM	Assemblée permanente des chambres d'agriculture du Mali
APPM	Association des pêcheurs et pisciculteurs du Mali
APRAM	Association des pêcheurs résidents au Mali
BAD	Banque africaine de développement
BADEA	Banque arabe pour le développement économique en Afrique
BARNUFO	Barbados national Union of Fisherfolk Organizations
BM	Banque mondiale
BVI	British Virgin Islands
CARICOM	Caribbean Community Secretariat
CBA	Cost Benefit Analysis
CBEM	Community-Based Ecotourism Management
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCPR	Code de conduite pour une pêche responsable
CCRF	Code of Conduct for Responsible Fisheries
CDPM	Caisse de développement des pêches maritimes
CDTs	Community Development Teams
CDUs	Community Development Units
CEMAC	Central African Economic and Monetary Community
CEMARE	Centre for the Economics and Management of Aquatic Resources
CENACOP	Central Artisanal Fishing Cooperative
CERESCOR	Centre de recherche scientifique de Conakry – Rogbanè (Guinée)
CFAF	CFA franc
CFP	Coastal Fisheries Programme (Pacific Islands)
CGIAR	Consultative Group on International Agricultural Research
CMS	Crédit mutuel du Sénégal
CNCPM	Conseil national consultatif des pêches maritimes
CNCR	Conseil national de concertation des ruraux (Sénégal)
CNPS	Conseil national des pêcheurs artisans du Sénégal
CNRA	Comité national de la recherche agricole (Mali)
CNROP	Centre national de recherches océanographiques et des pêches (Mauritanie)
CNSHB	Centre national des sciences halieutiques de Boussoura (Guinée)
COFFUB	Co-operative of Female Fish Smokers of Bonfi
COFI	Committee on Fisheries
CONAPEG	Confédération nationale des professionnels de la pêche en Guinée
CRAT	Centre régional africain de technologie
CRDI	Centre de recherches pour le développement international
CREDETIP	Centre de recherche pour le développement de technologies intermédiaires de pêche (Sénégal)
CRFM	Caribbean Regional Fisheries Mechanism
CRM	Coastal Resource Management
CRODT	Centre de recherches océanographiques Dakar-Thiaroye (Sénégal)
CRU	Commissions régionales des utilisateurs (Mali)
CSLP	Cadre stratégique de lutte contre la pauvreté

DANIDA	Danish International Development Agency
DFID	Department for International Development (Coopération du Gouvernement Britannique)
DFMR	Department of Fisheries and Marine Research
DFO	Department of Fisheries and Oceans (Canada)
DOF	Department on Fisheries
DRSP	Document de stratégie de réduction de la pauvreté
DWFN	Distant Water Fishing Nations
EAF	Ecosystem Approach to Fisheries
EC	European Commission
EcIA	Economic Impact Analysis
EDM	Energie du Mali
EEA	Economic Efficiency Analysis
EEZs	Exclusive Economic Zones
ENDA/TM	Environmental Development Action in the Third World Environnement et développement du tiers monde
EPA	Etablissement public à caractère administratif
EPST	Etablissement public à caractère scientifique et technique
EU	European Union
FAC	Fisheries Advisory Committee
FACs	Fisheries Advisory Committees
FAH	Fonds d'aménagement halieutique
FAO	Food and Agriculture Organization of the United Nations
FARMC	Fisheries and Aquatic Resources Management Council (Philippines)
FCFA	Franc CFA
FENAGIE-P	Fédération nationale des groupements d'intérêt économique de pêche (Sénégal)
FENAMS	Fédération nationale des mareyeurs du Sénégal
FEP	Fisheries Enhancement Programmes
FFDF	Federation of Fouta Djallon Farmers
FIDA	Fonds international de développement agricole
FIS	Fisheries Information System
FISON	Fisheries Society of Nigeria
FM	Fisheries Management
FMCA	Fishery Conservation and Management Act
FMO	Fisheries Management Organization
FMP	Fisheries Management Plan
FNP	Fédération nationale de pêche (Mauritanie)
FNPCG	Fédération nationale des planteurs de café de Guinée
FNRAA	Fonds national pour la recherche agricole et agro-alimentaire (Sénégal)
FPFD	Fédération des paysans du Fouta Djallon (Guinée)
FRAC	Fish Resource Advisory Council
GDP	Gross Domestic Product
GIE	Groupement d'intérêt économique
GRT	Gross Registered Tonnage
GTZ	German Agency for Technical Cooperation
HACCP	Hazard Analysis Critical Control Point
HIPC	Heavily Indebted Poor Countries
HM	Highly Migratory
ICAM	Integrated Coastal Area Management
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICLARM	International Centre for Living Aquatic Resources Management
IDAF	Integrated Development of Artisanal Fisheries
IDDRA	Institut pour le développement durable des ressources aquatiques
IDR	Institute for Development Research

IEC	Information, Education and Communication
IER	Institute of Rural Economy (Mali)
IEZ	Inshore Exclusion Zone
IFAD	International Fund for Agricultural Development
IFT	Institute for Food Technology
IIED	International Institute for Environment and Development
IIFET	International Institute for Fisheries Economics and Trade
IMBO	Institute of Marine Biology and Oceanography (Sierra Leone)
IMF	International Monetary Fund
IMROP	Institut mauritanien de recherches océanographiques et des pêches
INERA	Institut de l'environnement et de recherches agricoles du Burkina Faso
IOCARIBE	Sub-Commission for the Caribbean and Adjacent Regions
IRAD	Institute for the Agricultural Research (Cameroon)
IRAG	Institut de recherche agronomique de Guinée
ISAR RFE	Initiative for Social Action and Renewal in Eurasia
ISRA	Institut sénégalais de recherches agricoles
ITA	Institut de technologie alimentaire (Sénégal)
ITQ	Individual Transferable Quota
IUCN	International Union for Conservation of Nature and Natural Resources
IUU	Illegal, Unreported and Unregulated (fishing)
LA	Livelihoods Analysis
LDC	Least Developed Countries
LME	Large Marine Ecosystem
MANOBI	Société spécialisée en exploitation des technologies internet et téléphone mobile (Sénégal)
MCS	Monitoring Control and Surveillance
ME	Moyens d'existence
MEAs	Multilateral Environment Agreements
MED	Moyens d'existence durables
MIDECAM	Mission de développement de la pêche maritime
MIDEPECAM	Mission de développement de la pêche artisanale maritime
MPA	Marine Protected Area
MPEM	Ministère des pêches et de l'économie maritime (Mauritanie)
MRAG	Marine Resources Assessment Group
NACCIMA	Nigerian Chamber of Commerce, Industry, Manufacturing and Agriculture
NAFFA	National Association of Fish-farmers (Nigeria)
NAIRA	Nigerian currency
NAMMCO	North Atlantic Marine Mammal Commission
NCA	National Council on Agriculture (Nigeria)
NCU	National Coordinating Unit
NEAFC	Northeast Atlantic Fisheries Commission
NFA	National Fisheries Board
NFAAR	National Fund for Agricultural and Agro-allied Research
NFCPC	National Federation of Coffee Planters of Guinea
NFP	National Fisheries Policy
NGO	Non-governmental organization
NIFFR	Nigerian Institute for Freshwater Fisheries Research
NIOMR	Nigerian Institute for Oceanography and Marine Research
NMFS	National Marine Fisheries Service
NORAD	Norwegian Agency for International Development
NPRS	National Poverty Reduction Strategies
NR	Natural Resources
NRMCs	Natural Resource Management Committee
NUFAS	National Union of Fishermen and Seafood Dealers

NUFSD	Nigerian Union of Fisherman and Sea Food Dealers
OCEANIUM	Association sénégalaise travaillant sur la protection et conservation des ressources naturelles
ODI	Overseas Development Institute
ODRS	Office for Rural Development of Sélingué (Mali)
OECS	Organization of Eastern Caribbean States
OEPS	Economic Observatory of the Fishing Sector
OFF	Oceanic Fisheries Programme (Pacific Islands)
OLDEPESCA	Latin American Organization for Fishery Development
ONG	Organisation non-gouvernementale
OPM	Opération pêche Mopti (Mali)
PA	Pêche artisanale
PAE	Public Administrative Establishment
PCMR	Parliamentary Committee on Marine Resources (Sierra Leone)
PI	Pêche industrielle
PIB	Produit intérieur brut
PIP	Policy, Institutions and Processes
	Politiques, institutions et processus
PIPC	Programme intérimaire post-conflit
PIPs	Policies, Institutions and Processes
PNBA	Banc d'Arguin National Park (Mauritania)
PNG	Papua New Guinea
PNVRA	Programme national de vulgarisation et de recherche agricole (Cameroun)
PO	Professional Organization
POSEIDON	Aquatic Resources Management Ltd.
PRA	Participatory Rural Appraisal
PRSPs	Poverty Reduction Strategy Papers
PSC	Pacific Salmon Commission
PSTE	Public Scientific and Technical Establishment
RFO	Regional Fishery Organization
RSU	Regional Support Unit
SADC	Southern African Development Community
SADP	Stratégie d'aménagement du secteur des pêches et de l'économie maritime
SAILD	Service d'appui aux initiatives locales de développement
SAM	Special Area Management
SAPA	Subregional Office for the Pacific Islands
SDPA	Strategic Document on Poverty Alleviation
SEMRY	Rice Culture Expansion and Modernization Authority
SFA	Sustainable Fishery Advocates
SFLP	Sustainable Fisheries Livelihoods Programme
SIDs	Small Island Developing States
SL	Sustainable Livelihoods
SLA	Sustainable Livelihoods Approach
SNV	Swedish Environmental Protection Agency
SOWEDA	South West Development Authority (Cameroon)
SPC	Secretariat of the Pacific Community
SSF	Southern Shark Fishery
SSI	Semi-structured Interviews
STC	Scientific and Technical Committee
TA	Traditional Authority
TAC	Total Allowable Catch
TCP (FAO)	Technical Cooperation Programme (FAO)
TEV	Total Economic Value
TM	Tiers monde
TMAF	Traditional Management of Artisanal Fisheries

TOR	Terms of Reference
UCAD	Université Cheikh Anta Diop
UCN	Unité de coordination nationale (PMEDP)
UICN	International Union for Conservation of Nature
UM	Ouguiya (Currency in Mauritania)
UN/SOCA	Sub-Committee on Oceans and Coastal Areas
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNPAG	National Union of artisanal fishermen of Guinea
USAID	United States Agency for International Development
VAT	Value Added Tax
VMC	Village Management Committees
VPA	Virtual Population Analysis
WB	World Bank
WECAFC	Western Central Atlantic Fisheries Commission
WECAFC	Western Central Atlantic Fisheries Commission
WNW-AFCOD	West/North-West Artisanal Fisheries and Community Development Programme
WTO	World Trade Organization
WWF	World Wildlife Fund



# 1. CONCEPT PAPER FOR THE ADVISORY COMMITTEE ON FISHERIES RESEARCH (ACFR) WORKING PARTY ON SMALL-SCALE FISHERIES

Derek Staples

## SUMMARY

The purpose of this paper is to provide a framework to aid discussion for FAO's Advisory Committee on Fisheries Research (ACFR) Working Party on Small-Scale Fisheries. In particular, following the ACFR recommendations the paper addresses:

1. elaborating a draft research agenda;
2. undertaking an evaluation of the role and importance of small-scale marine fisheries, and
3. outlining ways in which the transition to responsible fisheries can be facilitated, bearing in mind the developing paradigm of the Ecosystem Approach to Fisheries (EAF).

The framework for elaborating a draft research agenda is based on identifying a number of issues pertinent to small-scale fisheries, and then providing a lead to possible research activities. The list is not exhaustive, but hopefully, sufficient to initiate and structure discussion.

After presenting a conceptual framework for small-scale fisheries that stresses the importance of considering factors both within the subsector, and external to the subsector, the following issues were identified:

- effectiveness of development policy to small-scale fisheries;
- measurement and understanding causes of poverty;
- competing policy goals;
- profile of small-scale fisheries in national policies and international development initiatives;
- tailoring fisheries management to small-scale fisheries;
- impacts of globalization and increased fish trade, and
- technological advances.

In reference to the second task presented above, the paper highlights the serious lack of reliable information on small-scale fisheries and suggests some approaches that could be used to overcome this deficiency. Lastly the paper describes ways that the transition to responsible fisheries can be facilitated, highlighting the importance of communicating research results, and also in adopting a more participatory fisheries management approach that considers fishing in the context of a larger system (ecosystem), and recognizing the need to satisfy the goals and aspirations of a wide range of uses and users (ecosystem approach to fisheries).

## 1. BACKGROUND

At the fourth session of the FAO Advisory Committee on Fisheries Research (ACFR) held in Rome in December 2002, the committee highlighted that small-scale fisheries had not received the research attention that it deserves when one considers the important contribution that this subsector makes to nutrition, food security, sustainable livelihoods and poverty alleviation, especially in developing countries. Although many of the issues such as user rights, excess capacity, illegal, unreported and unregulated (IUU) fishing, trade and incentives, governance etc, are common across all fisheries, these issues need explicit attention in a small-scale fisheries context. The committee emphasized the need for research to enhance our understanding of the dynamics of the subsector and recommended the establishment of an ACFR Working Party on Small-scale Fisheries<sup>1</sup> to:

<sup>1</sup> Note: the focus was originally on marine capture fisheries but was later extended to freshwater and estuarine systems.

1. elaborate a draft research agenda;
2. undertake an evaluation of the role and importance of small-scale marine fisheries; and
3. outline ways in which the transition to responsible fisheries can be facilitated, bearing in mind the developing paradigm of the ecosystem approach to fisheries (EAF).

### **Nature and characteristics of small-scale fisheries**

Small-scale fisheries occur world-wide in both developed and developing countries, but it is in developing countries that they play a vital role in the nutrition, food security and poverty alleviation of a large number of the world's inhabitants. Although some may be relatively well off, the majority of people undertaking small-scale fisheries in developing countries are relatively poor and vulnerable and it is this group that is the focus of the ACFR.

Small-scale fisheries can be broadly characterized as employing labour-intensive harvesting, processing and distribution technologies to exploit marine and inland water fishery resources<sup>ref 1</sup>. The activities of the subsector provides a source of food and livelihood for many of the world's poor and mainly supply fish and fishery products to local and domestic markets. They are harvested by both part-time (often seasonal) and full-time fishers operating from shore or small fishing vessels. It should be noted, however, that export has increased over the past two decades as a result of greater market integration and globalization, and can be part of the small-scale fisheries scene.

Although small-scale fisheries have often been thought of a discrete category in a fisheries sector sense, there is increasing evidence that this approach is not particularly relevant in many cases. There is in fact a continuum of fishery types that can be thought of as spectra along various dimensions. The main dimensions are the amount of capital being invested (ranging from none to fairly large-scale investments), the time involvement of the participants (ranging from part-time to full-time), the size/value of the stock being fished, the type of technology being used (including vessel size), the use of the product (ranging from subsistence to commercialization/profits), and the type of management regime. Small-scale fisheries will cluster at the lower end of all these dimensions.

In many countries, the people involved in this subsector are extremely poor and are unable to influence their operating constraints. As a result of increasing population numbers, rapidly expanding fish markets and improved harvesting technology, the pressure on fishery resources and aquatic ecosystems is increasing, and the status of the resources and associated ecosystems in many countries is thought to be seriously degraded with an overall trend for further deterioration. Indicators of over-fishing including declining catch per unit effort, widespread use of destructive practices (such as dynamite and cyanide fishing), declining size of fish caught and changes in the species of fish caught. This is being exacerbated by increasing degradation of fish habitats by coastal development, pollution, deforestation and siltation. Conflicts, both between different gears within the subsector and between small-scale and large-scale fisheries are increasing and the social instabilities, as evidenced by the break down in law and order and increased violation of rules and regulations, has resulted in declining quality of life in terms of health, education, crime, nutrition and the treatment of minorities. In many cases, the increasing conflicts, low compliance and declining resource base results in increased marginalisation of people involved in the subsector and mitigates against changing the status quo. Governments have often withdrawn support for managing the subsector through perceived poor investment of government funds.

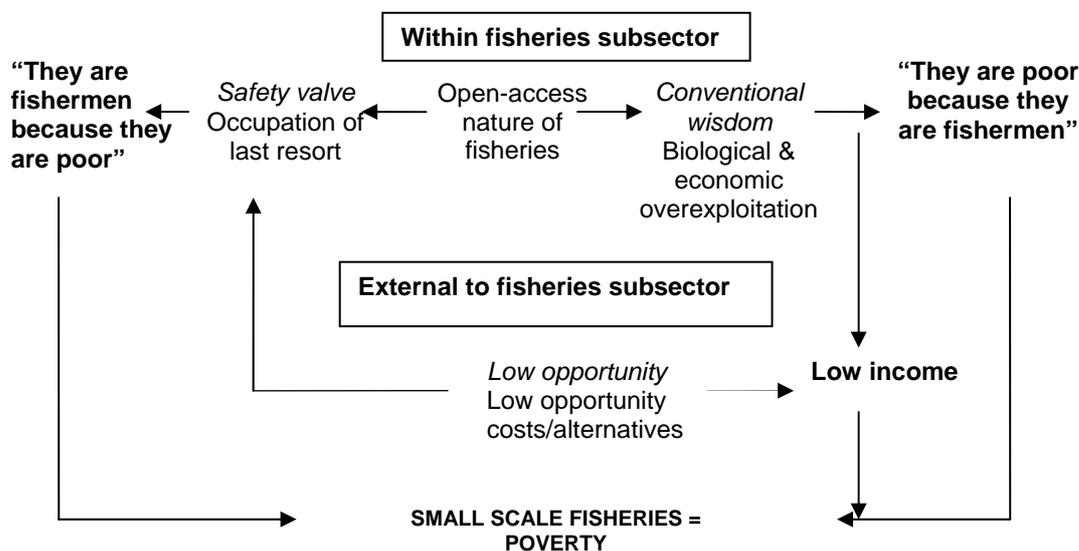
At the twenty-fifth session of the Committee on Fisheries (COFI), members requested FAO to provide more support for sustainable small-scale fisheries and to promote their better inclusion within the formulation of poverty reductions strategies. In particular, it called for FAO to *elaborate technical guidelines on increasing the contribution of small-scale fisheries to food security and poverty alleviation* and to also *develop an adopted [adaptive] ecosystem approach to fisheries tool box on small-scale fisheries [words in brackets are my interpretation of the original wording]*. This COFI recommendation arose from a fuller ACFR that called for case studies on a range of fisheries in developing and developed countries to learn how the ecosystem approach to fisheries can be used in practice, and to use the case studies to build a toolbox of scientific and management approaches, including such tools as rapid appraisals, participatory research and data gatherings, conflict resolution

tools, integrated resource management training, community-based and co-management, information sources, monitoring, evaluation and feedback.

### Conceptual framework for understanding small-scale fisheries

There are a large number of papers and reports relating to the issues inherent in the development and management of small-scale fisheries. Béné<sup>ref 2</sup> provides a useful summary of the literature as it relates to small-scale fisheries and poverty. He paraphrases the two main paradigms that have been advocated in the recent literature on poverty and fisheries as: (i) “they are poor because they are fishermen” and (ii) “they are fishermen because they are poor” (see Figure 1).

The first paradigm in Figure 1 is called *conventional wisdom* and relates to the open access nature of fisheries that allows more and more people to enter the fishery which, because of the “tragedy of the commons” leads to economical (and often biological) overexploitation of the resource, the dissipation of rent and finally impoverishment of the fishing community. This is the classical Malthusian concept of poverty: overexploitation of the resource results in low catch, which equates with low income and poverty. From this perspective, therefore, the problems lie solely within the fishery subsector itself and the solution is better fisheries management.



**Figure 1: Relationship between small-scale fisheries and poverty as conceptualised in the literature (redrawn after Béné (2002))**

The second is the *low opportunity* paradigm. Poverty is explained by using the concept of low opportunity incomes due to the lack of alternative incomes outside of the fisheries subsector that drives (or keeps) fishermen’s income to a low level. Thus, the causes of poverty lie outside the fisheries subsector and the solution is to improve the economic situation outside the subsector. In this scenario, it is important to note that a small-scale fisheries subsector, is extremely mobile with people moving into and out of fishing, both seasonally and over longer time spans, depending on the relative attractiveness of other activities compared with fishing at any given time.

Linking these two paradigms creates the perception that fisheries, because of their “open-access” nature, as well as lack of alternative opportunities, often offer employment of last resort. Some see this *safety valve* aspect of small-scale fisheries as a desirable aspect and not necessarily an undesirable attribute as espoused by the *conventional wisdom*. All these arguments, however, end up with the same conclusion that “small-scale fisheries = poverty”.

Béné (2002 and pers. comm.) and others (eg Allison, pers. comm.) are currently examining the extent to which the hypotheses linked to the two paradigms are verified by empirical data. This is a high priority research topic (see below – issue 2), but regardless of the outcome, Figure 1 does serve as a useful conceptual model to examine strategies to improve the contribution of small-scale fisheries to sustainable development, and allows the issues to be thought of as those (i) within the fisheries

subsector and (ii) outside of the fisheries subsector, noting that both have to be addressed to make any significant progress.

## **2. RESEARCH AGENDA**

The first section of this paper addresses the first ACFR recommendation and presents a framework to facilitate the development of a research agenda that will assist FAO implement its strategies for increasing the contribution of small-scale fisheries to human well-being and sustainable development. It does this through identifying the key issues and options for improved management in the context of multiple uses of marine, estuarine and inland waters and the ecosystem approach to fisheries, with special emphasis on poverty alleviation and food security in developing countries and provides discussion points for elaborating a draft research agenda.

Some issues highlighted below are external to the fisheries sector but impact on it, while others need to be dealt with within the sector itself, and yet others span across both. In order to provide a framework for the development of a research agenda, the issue is first described, activities and interventions currently in place to address the issue are then briefly presented and the research needs associated with the issue presented as a basis for further discussion by the Working Party.

### **2.1 Issue: Effectiveness of development policy to small-scale fisheries**

Over the past 50 years a significant amount of development aid sponsored by national, bilateral and multilateral funding has been provided to raise the standard of living of small-scale fishers and their communities in developing countries. No recent estimates are available but an earlier estimate reported a total of US\$3.73 billion in the period 1974-85. FAO currently has projects that involve small-scale fisheries valued at US\$80 million (Neiland<sup>ref 3</sup>).

During the past decade or so, development policies and thus, the focus of development aid have changed radically. Originally the dominant policy favoured structural adjustment in the form of trade liberalization, deregulation and stabilization, in which it was assumed that the poor would benefit along with other sectors of society. More recently, the need to focus more directly on combatting and eradicating poverty has been realized, although initially, poverty was considered as a fairly simple concept that could be measured by a single economic indicator, such as the international poverty line of US\$1/caput/day. It is now accepted that poverty is a complex issue characterized by low income, poor health, low literacy levels, under-nutrition, inadequate housing and living conditions. It is also extremely dynamic with people moving in and out of poverty, and it is highly correlated with social exclusion, marginalization, vulnerability (susceptibility to falling into poverty) and lack of power. This focus on poverty eradication was further endorsed at the recent World Summit on Sustainable Development (WSSD) where a plan of action to halve the level of poverty by 2015 was adopted (as measured by income, level of hunger and access to safe drinking water)<sup>ref 4</sup>.

The main aim of most interventions in supporting these changing policies for small-scale fisheries over the past two decades was to promote “fishery development” based on the assumption that these interventions would lead to poverty alleviation and increased food security. Interventions have included:

- improving technology (both gear and fishing vessels);
- improved post-harvest processing and marketing;
- provision of credit;
- improving fishery management through allocation of user rights and access control;
- re-allocation of fishery resources (e.g., between small-scale and large-scale fisheries);
- enhancing fishery resources through restocking;
- increasing aquaculture to relieve pressure on capture fisheries;
- improving resource and environmental conservation measures;
- focusing on management through community-based initiatives;

- adopting new participatory and co-management approaches;
- training and capacity building;
- raising awareness of the importance of the contribution of small-scale fisheries to livelihoods, food security and quality of life;
- increasing economic growth and providing a wider diversity of employment and livelihoods, and
- providing more recently assistance in setting policies with their supporting legislation and institutions.

In general, the consensus is that these interventions have not been that successful with respect to small-scale fisheries (with some exceptions), although the causes of failures are very varied and range from poorly formulated policy to poor implementation of strategies, poor monitoring and lack of follow-up. It is, therefore, not possible to conclude that the intervention itself was not worthwhile. However, history has clearly demonstrated that because poverty and the causes of poverty are extremely complex, it is apparent that they can not be addressed by simply transferring technology and capital investments and that an integrated set of interventions is needed, not just one or the other. For example, if overfishing is the problem, restocking may be an option, but this would need to be complemented with seeking supplemental livelihoods and re-directing fishing through some incentive scheme during the period of stock rebuilding.

The changes in development policies have tended to come about through trial and error but they have far-reaching effects. As well as direct influence in terms of supporting various interventions, the dominant paradigm of the day also serves to set national policies and their incentive and disincentive schemes. For example, based on some of the earlier “fishery development” interventions, many developing countries are either subsidizing large-scale fisheries to promote their development at the expense of the small-scale subsector, or assisting small-scale to adopt more modern technologies in the belief that they will then become more “modernized” larger-scale operations or, in some cases, even subsidizing both.

In fisheries, policies that have promoted increased economic growth at a national level have tended to favour the development of large-scale approaches over small-scale ones and the resources being concentrated in fewer and fewer hands. There is some indication that during periods of sustained economic growth (e.g. in Asia), the level of poverty has reduced, but these findings tend to be based on simple economic indicators (e.g. income/caput/year) at the global level, and there is very little information on how changes in economic growth affect poverty in fishing communities. Some countries have shown rapid economic growth but have not shown corresponding improvements in human well-being, as measured through one or other of the accepted poverty indices. It is obvious that in countries where policy implementation is poor and where the power is concentrated in the wealthiest section of the society, the flow-on effect to the poor will be negligible.

Interventions that have attempted to establish some sort of property rights for the fisheries, followed by appropriate management and governance systems have had more success, although they often fail when local conditions and constraints have not been taken into account and linkages between national policy and on-the-ground management objectives not tightly linked. An important success criteria should be that they become sustainably funded from rents generated in the fisheries and not dependent on development aid. This has rarely occurred.

### **Research implications**

The major research question is to what extent the current paradigm of development policy takes into account the nature and characteristics of small-scale fisheries, especially the common property nature of the fishery resources, the fact that they are renewable but limited, and that they are part of a complex web of multiple uses and users. In terms of poverty alleviation, are small-scale fisheries a useful entry point at all? Do they have any real capacity to reduce poverty and if so, which of the above interventions have worked best and why? Many causes of previous failures will be found, including whether a particular intervention was based on an inadequate analysis of the causes or

whether it was fragmented in nature and aggravated rather than being fixed problems etc. Research could possibly provide better overall analyses of these approaches to guide future development assistance.

Research on the objectives, approaches and impacts of donor-funded projects operating within the current development policy paradigm should enable a better understanding of the socio-political circumstances, the policy and legal frameworks and the local conditions in which interventions are likely to succeed or not. Review and analyses of project and programme evaluations should also provide some insights into the causes of failure and point to alternative approaches.

A follow-up question is whether the modern development paradigm of focussing on poverty reduction will yield better results than some of the old paradigms, especially basic fisheries management paradigms. Many texts, including the Code of Conduct for Responsible Fisheries (CCRF) and its international plans of action (IPOAs) advocate a reduction in fishing effort and capacity to increase the yield from the resources and gain improved economic and social benefits. Should the development focus all be directed towards finding ways to remove excess fishers and vessels from small-scale fisheries? Are there other interventions that could be more successful, especially if they include capacity building and handover of processes to existing institutions? More socio-economic research should be carried out to better understand the links between macro economics and livelihoods. This coupled with indicator development should provide a better analysis of what is often not revealed in the common practice of simply reporting on economic indicators. It will obviously need to include studies on the distribution of wealth in both developing and developed countries and build on the work of the many publications already published on this topic. Very few of these, however, focus on one or other of the resource sectors and there are few devoted to looking at small-scale fisheries, how they are structured and how power is distributed.

## **2.2 Issue: Measurement and understanding of the causes of poverty as it relates to small-scale fisheries**

Although Figure 1 provides a convenient conceptual framework for small-scale fisheries and their link to poverty, all the ideas embraced in this model are based on various hypotheses and assumptions that have been recently questioned. For example, some recent research suggests that most small-scale fisheries have some degree of access restrictions and are not necessarily characterized as being the employment of the very poor, or, in fact, the activity of last resort. Because development policies on poverty and poverty reduction are based on these perceptions, as noted by the third session of the ACFR, a top priority is to obtain a better understanding of the nature, causes, dynamics and extent of poverty as it relates to small-scale fisheries.

Improved methods for measuring poverty are developing quickly. A number of single indicators of poverty that focus almost exclusively on the health, the education, or income have been advocated as a measure of the extent to which the inhabitants of a country are experiencing poverty. A number of composite indicators have also been developed that allow several indicators to be aggregated together to give a more general measure of poverty and living standards. The United Nations defines poverty as "denial of choices and opportunities most basic to human development – to lead a long healthy, creative life and enjoy a decent standard of living, freedom, self esteem and the respect of others" and advocates the use of a Human Poverty Index (HPI) that is aimed at measuring the level of deprivation and poverty being experienced in a country. There are two HPI indices most commonly used; one for less developed countries and one for the rest.

It appears that although these indices exist, there are very few studies that focus on assessing and identifying the extent, nature, causes and dynamics of poverty in situations where small-scale fisheries are involved (Macfadyen and Corcoran<sup>ref 5</sup>).

### **Research implications**

The Sustainable Livelihoods Approach (SLA) is a useful analytical tool that can be used to understand fisher communities, their level of dependence on the fish resources, their ability to engage in alternative livelihoods activities as well as the broader legal and institutional constraints in which they operate. It is a multi-sectoral approach based on participation of the stakeholders that makes it

particularly relevant to identifying the nature and causes of poverty in the context of small-scale fisheries. It should be able to test some of the hypotheses advocated over the years. For example, is small-scale fishing an “activity of last resort”, to what extent are the resources “open access”, etc?

By design, SLA is usually applied in situations where one is dealing with geographically small units. The development of realistic participatory poverty measurement methodologies that can be used to evaluate poverty-reduction policies across broader scales will also be needed. Related techniques used include Participatory Poverty Assessments, Well-being Analyses, Poverty Mapping, Wealth Ranking and Poverty Profiling. The sectoral approach outlined in the FAO technical guidelines on developing a set of agreed indicators to evaluate how fisheries contribute to sustainable development (FAO <sup>ref 6</sup>) could provide a complementary methodology but needs to be tested in the context of small-scale fisheries.

Development of these methodologies will assist in answering important questions such as: What is the proportion of people in transitional and chronic poverty in small-scale fisheries. How are different members of the community affected? What are the main contributing factors to poverty, and what type of policy intervention is necessary to address them.

Macfadyen and Corcoran<sup>ref 5</sup> list a large number of other areas requiring further research within the SLA framework including: better analyses of the linkages between different types of assets; increasing the value of information, especially that derived from traditional and local sources; understanding cross-sectoral linkages as well as more research on the process itself in terms of obtaining better participation and links between SLA and other more traditional economic appraisal techniques.

### **2.3 Issue: Competing policy goals**

A key factor in strengthening governance and institutional support for small-scale fisheries will be to assist countries in resolving the competing policy imperatives of:

- (i) optimal and sustainable use of fish resources and their supporting ecosystems;
- (ii) economic objectives, especially in relation to either small- or large-scale fisheries;
- (iii) social objectives, including maximizing employment and improving livelihoods;
- (iv) objectives related to equity, including access for only small-scale fisheries, and
- (v) any other objectives (for example trade liberalisation, market access etc.) which may impact on this subsector.

Very few fisheries, either large-scale or small-scale have adequately considered and resolved the trade-offs among these objectives that need to be agreed upon in setting clear policy in which fisheries management can be framed. For example, trade-off agreements need to be reached on:

- equity vs. efficiency;
- maximizing sustainable yields (and economic benefits) vs. widespread employment and providing a safety valve for the poor;
- export-oriented production vs. national food security;
- imports vs. national production;
- large-scale vs. small-scale fisheries;
- long- and short-term management goals;
- market liberalization vs. protection of small-scale fisheries, and
- foreign fishing vessels vs. local fleets.

In fisheries, this lack of clarity with respect to the objectives often leads to conflict among competing subsectors (e.g. small-scale fishing vessels vs. large-scale fishing vessels) resulting in many management interventions implemented to fix the symptoms, not the problem itself.

## Research implications

Many countries in the world have agreed to a number of high level principles relating to fisheries and ecosystem management (e.g. the CCRF). Within these principles, however, decisions need to be made on how countries are going to address the issue of poverty in the context of small scale-fisheries.

Policy and decision-makers require some sort of decision support system based on cost/benefit analyses to make the necessary trade-offs, coupled with data collection activities to monitor and, if necessary, modify decisions. For example, how do the potentially high costs associated with small-scale fisheries management compare with the cost of resource depletion, loss of employment, income and food security, both in terms of economic and societal values, if no management system was in place? What compensation might be necessary to reduce fishing capacity of large-scale fisheries (e.g. buy-back scheme) and how does that compare with the potential benefits that may be derived from the small-scale fisheries? One approach to answer these questions and scenarios is to develop fairly well-elaborated models of the system and input of, at the very least, basic economic data to gauge benefits and costs under different scenarios. However, useful results could also be achieved through the sharing and exchanging of existing experience and knowledge, the so-called participatory research approach. More work is needed to examine the impacts (particularly social impacts) of policy such as supporting aquaculture as an alternative to fisheries management. The approach also needs to involve the broader sets of policies such as trade policies that impact on small-scale fisheries and which could play a major role in changing the status quo. These research findings need to be fed back to the policy-makers.

The FAO Technical Guidelines on Fisheries Management and the Ecosystem Approach to Fisheries (Supplement 2)<sup>refs 7,8</sup>, recognizing that these sorts of decisions and trade-offs are difficult to make at the higher policy level, and recommends that the best approach to the paradox of competing objectives is to adopt a participatory approach to translate the higher level policy goals into operational objectives at the fishery level and resolve conflict with the stakeholders in terms of how the fishery can best contribute to sustainable development at the level of management interventions. This recommendation needs to be explored in the context of small-scale fisheries.

More institutional and legal research is needed to provide better advice on how to set up successful institutional and legal frameworks. The FAO currently has a compendium on fisheries legislation but it is incomplete and out-of-date. If these databases were updated, analyses of these data could lead to better guidelines on how to construct legislation to support small-scale fisheries and how draw up complementary law to support traditional law and government policies, such as decentralization.

### **2.4 Issue: Profile of small-scale fisheries in national policies and international development initiatives**

Small-scale fisheries are often marginalized and ignored in national and regional planning and policy development. Recent analyses have shown that many of the national Poverty Reduction Strategy Papers (PRSPs) that are being developed do not, in general, include small-scale fisheries and given the importance being placed on these documents, this is a serious concern. Two sub-issues are important here: (i) inadequate information; and (ii) lack of understanding of the overall policy and planning processes to be able to influence decision-makers, even if adequate information was available.

There are many statistics on the contribution of small-scale fisheries but all are qualified in that they are not accurate. The basic statistics are often informed guesses, or in many cases simply not collected at all. Most fishers are not licensed and operate on part-time or seasonal basis. A large number are also involved in the processing, marketing, transportation and other service sectors. Coates<sup>ref 11</sup>, for example, demonstrated that the total world figure of 4.5 million people employed in inland capture fisheries was easily exceeded by an in-depth study of eight countries in Asia alone. Data collected from projects conducted in the Mekong Delta indicate that the production is several time higher than that officially reported. Similar project information from the coastal waters of the Philippines and Viet Nam suggest that actual production may be as much as three times that reported. Seilart<sup>ref 12</sup> calculated that on the basis of census data for the Philippines up to half of the whole population of that country were involved in some way in artisanal fisheries, a figure that underlines the importance of artisanal fisheries to the rural poor.

However, even if we rely on these underestimates, it is clear to see that small-scale fisheries provide significant employment, household income and food for a large percentage of the world's population. Of the top seven fish-producing countries, five are developing countries. Three of them (China, India and Indonesia) have populations of nearly 1 billion people living below the UNDP poverty line of US\$ 1 per day. It is currently estimated that the global fisheries production has reached 130 million tonnes in 2000, 36 million of which is produced in aquaculture (FAO<sup>ref 9</sup>). Current figures suggest that artisanal, small-scale fisheries contribute more than 25 percent of the world's catch and account for more than half of the world's direct human consumption (FAO<sup>ref 10</sup>). It is also estimated that there are at least 35 million people employed in the marine and fresh-water production components, of which 80 percent work in Asia and approximately 80 percent of these are small-scale or artisanal fisher folk. In terms of GDP, however, the small-scale subsector is a minor contributor.

There are many reasons that could be put forward as to why small-scale fisheries have tended to be overlooked and marginalized over the years, despite the overwhelming evidence that they are important. The first is the institutional make-up of the ministries and departments themselves, which has often been based on those of developed countries (for example, fisheries are often only a small section of a larger agriculture department). The backgrounds senior staff and Minister are often in agriculture and fisheries have not been part of their training or past experience. A further reason is that, small-scale fishers are often from the lowest economic strata and have little voice, except when there are crises.

Policies are often economically driven and, as and because small-scale fisheries are insignificant contributors to GDP, they are largely overlooked. Commercial fisheries are seen as a source of tax while small-scale fisheries do not attract much public attention and remain relatively unknown. On the political front, attempts to impose management regulations on small-scale fishers often leads to unfavourable political exposure due to the perception that the livelihoods of the poor fisher are being threatened.

In general, small-scale fishing is perceived by planners and policy- and decision-makers as a subsector that takes care of itself. A long-held view (still held in some countries, especially in Latin America) was that these fisheries could be "modernized" and the larger-scale commercial fisheries have been systematically favoured in the belief that the benefits derived from the newer fisheries would flow through the economy to the original participants. Another mis-directed policy has been that aquaculture will grow at such a rate that it will be able to compensate for the reduced supply of fish resulting from poor management and again the original participants would be better off by taking up fish farming. However, despite these efforts, small-scale fisheries have not been displaced in either developed or developing countries. In fact, there are now more small-scale fishers producing protein for human consumption than ever before and the need for solutions to the many issues is even more urgent.

### **Research implications**

Two related research needs arise from this discussion. The first is how to measure the contribution small-scale fisheries (addressed in section 3 in more detail below) and the second is policy research to gain a better understanding of why small-scale fisheries are often ignored in policy development and implementation processes.

It is obvious that better estimates of the contribution of small-scale fisheries are urgently needed. Conventional methods of sampling and data collection as used to collect information on large-scale fisheries are impractical or too expensive to apply to the very widely dispersed fishing communities and markets throughout the world. They also focus on one sector – fishing and tend to overlook the multiple use and multiple user nature of aquatic resources.

Several hypotheses as to why small-scale fisheries have tended to be ignored in the past are put forward above. Much more work is needed to test these hypotheses, identify the real reasons for their marginalization and seek mechanisms for integrating this subsector into mainstream policy and planning processes. The role of the different government of non-government agencies, especially national and local planning bodies needs to be much more clearly defined, in the context of aquatic multiple use and developing country's poor governance.

## 2.5 Tailoring fisheries management to small-scale fisheries

It is well-recognized that fisheries management based on scientific information, stock assessments and controls on the harvesting of target resources (with appropriate monitoring and enforcement) that has formed the basis of fisheries management in the northern hemisphere (and more recently transferred to the southern developed countries) is often not applicable to small-scale fisheries that are multi-gear, multi-species and characterized by a mobile group of harvesters. In general, it is concluded that this type of management is too expensive, too uncertain, and not practical.

Despite this, fisheries managers in developing countries have typically looked to the fisheries science emanating from developed countries for solution to their problems. Among these managers, there is still a widely held view that management and management planning cannot proceed until the stocks have been assessed, yield estimated and management reference points in terms of catches and fishing mortality have been established. This approach has been re-enforced by the training and extension programmes supporting formal stock assessment through LSFA (length frequency stock assessment) and ELEFAN (electronic length-based assessment analysis). However, in most small-scale fisheries, this approach is simply not applicable or practicable and has delayed the introduction of fisheries management based on setting management objectives supported by a broad range of research to assist in policy formulation and broader fishery assessments.

Noting the failure of these more conventional fisheries management approaches, especially in developing countries, a range of alternative approaches have been advocated. These include:

- broader systems approach within the fisheries sector (e.g. ecosystem approach to fisheries);
- integration of natural resource management across sectors (e.g. integrated coastal area management, sustainable livelihoods, and large marine ecosystems);
- decentralization and participation at the community level (co-management);
- introduction (or in some cases re-introduction) of rights;
- area and time closures including MPAs and exclusion zones;
- improved governance systems;
- incentive-based approaches (not command and control) especially market access, and
- market-based approaches (e.g. certification and ecolabelling).

The introduction of one or other of these alternative approaches pre-supposes that the policy trade-offs have been made and legal framework exists to implement the required management. For example, applying a management regime that results in the re-allocation of resources through the introduction of access rights in whatever form, presupposes that there has been a decision made that the long-term increased ecological and economic benefits for the fishery as a whole outweighs the social disruption and un-employment that will result in the short-term.

Many of the alternative approaches would appear to be, in fact, much closer to the systems that existed prior to colonization. In many countries, these traditional approaches involving right-based access to the resources, rules and regulations governing their uses and an agreed set of sanctions have been made dysfunctional through the development of more central government control mechanisms. Some advocate the need to re-adopt some of these, but in the context of the modern more globalized world, dominated by increasing technology, markets and economic paradigms, this may not be appropriate. For example, in the inland fisheries of Bangladesh, when the state attempted to transfer property rights over fishing grounds through the fisheries co-operatives, it was the leasees (fish merchants and money lenders) that captured the right and benefited from the rent generated (Toufique<sup>ref 13</sup>).

Many case studies throughout the world have highlighted the problems associated with a top-down central management regime, especially in countries where the types of fisheries are extremely diverse, scattered geographically and employ large numbers of people. In more recent years a move towards co-management has led to greater involvement of communities with the setting of management objectives, rules and enforcement/incentive schemes. However, in many of these cases the role and

responsibilities of the different players (national governments, state/provincial governments, local governments/councils, communities, fishery organizations, individuals and NGOs) is often unclear and there is often a very tenuous link between central agencies and community activities. In addition, although governments may indicate support for co-management, they are often implemented without full adoption of the principles of co-management, appropriate regulations, administrative procedures and authority structures.

A broad range of measures will need to be considered including modified rights based approaches, (possibly including traditional rules and regulations), ecosystem-based measures such as Marine Protected Areas, stock restoration and integrated solutions looking to solve fishery issues through working in other sectors. Different approaches will need to be tried and tested through a process of learning and adaptation. Costly command-and-control systems will need to be replaced with more incentive-based systems and Governments will need to invest in providing long-term benefits by compensating for short-term losses.

### **Research implications**

A major research thrust needs to be applied in estimating the costs and benefits of any form of fisheries management in the context of small-scale fisheries. Again this requires clear policy goals on what management is trying to achieve but it should be possible to examine the costs and benefits with respect to both the social and economic dimensions. Research should lead to a simple "narrative" or message that says that if governments and communities invest say 10 percent of the money earned from selling fish into improving the management of the fishery, then they will benefit to the tune of 40 percent. This type of simple message could form the basis for change. Alternatively it could be put in terms of what would be lost if small-scale fisheries were not better managed. Even in subsistence fisheries, it will be necessary to demonstrate convincingly that reducing the number of fishers could result in an increase in the amount of fish available for food. This appears counter intuitive to most and it is difficult to argue against the commonly held view that an increase in the amount available for food will result if we have more fishers with more efficient gear.

There is a general lack of understanding on the effectiveness of all the alternative approaches but this could be gained through trial and error, given sufficient time. In one practical approach to speed up this learning process is, as recommended by the ACFR (endorsed by COFI for small-scale fisheries) to set up of a series of demonstration case studies where one of the alternative approaches (i.e. the ecosystem approach to fisheries) can be tested and used to develop a tool kit of science and management measures including rapid appraisal techniques, participatory research, and data gathering, conflict resolution tools, integrated resource management training resources, community-based and co-management, governance and institutional regimes, monitoring and evaluation of management performance and feedback.

Examining case studies where alternative forms of management have been implemented is another way of increasing our learning. For example, studying the socio-economic impacts of management on livelihoods of the fisheries communities (Jallow<sup>ref 14</sup>), examining strengths and weaknesses of different co-management approaches along the lines of Sverdrup-Jensen, and Nielkson<sup>ref 15</sup> and the World Fish Centre (WFC) (formerly ICLARM) and providing more information on how central government policy and institutions can be linked to the older more traditional approaches would be useful.

More basic social research is required to better understand existing social networks and traditional forms of management as a basis for developing alternative governance regime as has been recently considered across a number of countries by FAO<sup>ref 17</sup>. In particular, research on existing traditional management systems, even if such systems are now eroded by so-called modern systems, could also be useful in building better co-management. This might result in a better understand of changing power bases and incentives for certain types of behaviour, such as undermining the authority of traditional leaders and uptake of community-based fisher's organizations and the participation of fishers in planning and management.

## **2.6 Issue: Impacts of globalization and increased fish trade**

Although globalization and increased fish trade is lauded by some as having many benefits in terms of national and global economies, it is also well known that inequities exist in terms of the beneficiaries.

One view of globalization, as supported by IMF and the World Bank, views it as a positive phenomenon. It argues that because the private sector is more efficient than the state, liberalization will lead to greater global competition that in turn will cause national companies to become more efficient. Globalization is seen as inevitable and unavoidable and national economies and institutions will have to adjust by making themselves more efficient. Since the market is (almost by definition) efficient, there is little or no need to regulate it. If a country does not benefit, it is suggested that the in-country policies need to be reviewed and institutions need to be reformed.

Globalization as seen by others as part of a process by which the rich developed countries in the northern hemisphere are attempting to retain the economic advantages and powers they enjoyed during the colonial era. Liberalization of finance, trade and investment has allowed the industrial countries' goods and firms to enter into and take over a significant portion of the markets of developing countries. Many warn of the dangers of the private sector replacing the state. The benefits and losses of globalization, therefore, are very unevenly spread and it is easy to see that the small-scale fisheries in developing countries may not be the winners.

### **Research implications**

The extent to which these two paradigms is reflected in terms of small-scale fisheries warrants serious research. Better information on distribution pathways and market trends for fish products may assist policy decision-makers capture the benefits for all sectors of the economy and shield small-scale fisheries from adverse impacts.

Again with many of the issues addressed above, the issue of distribution of wealth is central to this issue and needs to be addressed. Other possible research topics include the extent to which international protocols and agreements protect the rights of the small-scale fisheries subsector and how agreements/protocols be reformed to address their concerns and vulnerability. Also interesting to ask is to what extent these agreements/protocols are complied with and how does the subsector feed into these international and regional policies processes and agreements.

## **2.7 Issue: Implementing the IPOAs on capacity and IUU fishing**

The Johannesburg Plan of Action, a key outcome of the WSSD states that the FAO IPOA to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing needs to be put into effect by 2004 and the IPOA on the management of fishing capacity by 2005. To date, the main focus of the IPOAs has been on large-scale commercial fisheries but many of the objectives and actions required apply across all types of fishing. Implementing these IPOAs in small-scale fisheries will require some form of customization in the small-scale fisheries context. For example, because many of the vessels engaged in small-scale fisheries do not come under a licence scheme, the term "illegal" is not particularly relevant. The issue of unregulated fishing/unreported catch (see 3 below) is wide-spread and should be central to the development of national IPOA plans and policies.

Implementing the IPOAS will also imply reconciliation of the many policy trade-offs considered above (for example, reducing capacity in small-scale fisheries would displace a large number of fishers who would require alternative employment/livelihoods). It is now widely recognized that the capacity (both labour and capital) in small-scale fisheries is excessive and it needs it to be reduced but if the social impacts are also unacceptable, how can this be done?

The second issue in implementing the IPOAs will be the impact on the small-scale subsector when they are implemented in large-scale fisheries. In theory, implementing the IPOAs should reduce the pressure on the world's fish stocks. However, if left to market forces, the open access nature of many fisheries could result in any benefits being quickly eroded by the displacement of large-scale fisheries to the detriment of the small-scale sector.

## **Research implications**

In terms of the direct impact of implementing the IPOAs in small-scale fisheries, policy analyses are urgently needed to determine how the reduction of capacity and IUU fishing would impact on the socio-economic conditions of small-scale fisheries. We will also need to understand the indirect effects that removing IUU fishing and capacity in the large-scale fisheries will have on small-scale fisheries. The distributional pathways of the intended benefits will need to be understood and the costs and benefits more fully analysed.

### **2.8 Issue: Technological advances**

Technological advances in fishing gear and fishing vessels have been one of the major goal in development aid policies in the past, although the introduction of technology without a better understanding of its impacts on limited natural resources, except in emergency situations is now being questioned. Other technological advances at the post-harvest stage, which enhance the value of the product or the working conditions of the fishers remain desirable and should be encouraged, based on better research and knowledge. For example, improved efficiency in small-scale fisheries post-harvest systems, marketing and the promotion of exports of products from small-scale fisheries could provide greater returns on the existing level of catch. Food quality and food safety, both in terms of their impact on price as well the risks for human health will continue to be a major issue and one that will increase in complexity as markets, especially export markets expand.

## **Research implications**

A range of post-harvest technological research for more cost-effective solutions is needed, as well as research on the impacts and implications of post-harvest practices on the environment. Market research focusing on more efficient post-harvest processing, value-adding and distribution of products would be useful. Although much has been done in developing techniques for converting fish for agriculture and fish feeds, the Working Party should look at ways this can either be improved or implemented to support rural poverty and food security. Research into alternative ways of utilizing the catch is still needed.

### **3. EVALUATION OF THE ROLE AND IMPORTANCE OF SMALL-SCALE FISHERIES**

The issue of how to undertake an evaluation of the role and importance of small-scale fisheries is discussed in this second section of this paper. Further details are included in the background papers “Contribution of Small-scale Fisheries to Rural Livelihoods in a Water Multi-use Context” and “Improving the Collection, Analysis and Dissemination of Information in Small-scale Fisheries”.

Although small-scale fisheries are recognized as having a very important role as a source of employment, nutrition, food security and income, there is a serious lack of information regarding this subsector. The beneficiaries of small-scale fisheries are not just the fishers themselves but the contribution needs to be considered in the broader context of:

- employment and associated financial and food security benefits for participants;
- financial and food security for the dependents of participants;
- food and nutritional benefits for end consumers
- employment and associated benefit for those involved in related services, and
- national taxation and export revenues.

In this context, the contribution of small-scale fisheries needs to be examined at both a macroeconomic level and at a community level.

In the past, attempts have been made to estimate the importance of small-scale fisheries using measures and methods developed for large commercial fish stocks that are landed in a small number of landing sites by a relatively small number of people who often have to provide the information as part of some sort of management system. Based on this conventional approach, the role and importance of the subsector has been examined by trying to estimate:

- a) total catch;
- b) number, age and gender of people employed in harvesting and processing;
- c) income of the harvesting and processing sectors;
- d) amount of fish supplied for direct consumption (i.e. not sold);
- e) amount and value of fish sold locally;
- f) amount and value of fish exported/imported;
- g) total amount of fish consumed;
- h) nutritional value of fisheries products in diet;
- i) social and cultural importance of fisheries (e.g. life style, religious linkages, etc).

However, the complexity in terms of the multiple uses and users of the resources, as well as the geographical spread of the subsector makes this traditional sector approach very difficult logistically and statistically to implement without an enormous budget and personnel. It is no wonder, that there is a general lack of information. What is available at a national level is also difficult to access, even from national government offices and is often unreliable. Some data sets collected at community level are available, but these are often associated with short-term aid projects and are not very useful at broader spatial or temporal scales.

The approach to evaluate this subsector needs to be broadened out to a more integrated assessment approach in which the contributions of different sectors need to be considered together. As pointed out in Béné's background paper, several complementary approaches are available (e.g. economic efficiency analysis, economic impact analysis and socio-economic surveys and sustainable livelihoods). What seems to be required is better coordination and closer working relations with the different Departments and agencies that collect data as well as new innovative data collection techniques. A real network approach based on people with the skills, personal networks and time available to undertake this type of study will also be required. It will also have to be based on both quantitative and qualitative data.

Once the type of information needed by the various users has been developed, there are a number of ways the data could be collected. The survey techniques required for multi-sectoral socio-economic valuations have been used for agro-pastoral and agro-forestry systems now for many years, including poverty profiling, institutional analyses and multi-sectoral activity analyses.

Some ideas on newer approaches to data collection which might be considered in obtaining the necessary information are presented below.

#### **Use of co-management partners**

Provided the right incentives are provided, the non-government partner in a co-management endeavour is often in a better position to collect and make available basic data on landings and other information useful for management. An excellent example is provided by the DFID-funded Integrated Lake Management in Uganda where authority for management has been devolved to Beach Management Units who each have a data collection role and provide information back-up to Government. Fishery associations can be used to collate information from their members, fishing companies can be used to supply information to governments, and intermediate buyers and sellers usually keep good records that can be utilized.

#### **Agriculture surveys**

With the inclusion of appropriate fishery-related questions in national agriculture surveys, it may be possible to provide structural and other social and economic data on small-scale fisheries. Some developing countries are starting to apply these kinds of questions (e.g. In Viet Nam, answers to the question of source of income revealed that nearly 70 percent of households engaged in some fishery and aquaculture activities).

### **Household consumption surveys**

Household consumption studies are increasingly used to estimate regional and/or national consumption of fish. Despite the difficulties in obtaining representative data, for example obtaining accurate data from women and children and other less-empowered minorities, these types of surveys show considerable promise. They can be coordinated with other sectors, thereby reducing costs and can have extensive coverage. The data can not only be used to estimate the dependence of rural communities on fish but can also be scaled up to give estimates of total yield.

### **Market surveys**

Market surveys at landing sites (where fish is often first sold) as well as markets themselves can be used to give indications of value and can also provide data on trade, imports/exports, trends in the types of food landed, etc.

More details on use of these methods as well as some others are discussed for the Asian region in FAO Fisheries Technical Paper No. 401<sup>ref 17</sup>.

In addressing this topic, the Working Party will have to decide whether the evaluation of the subsector should be a one-off snapshot of the contribution, or whether a longer-term strategic framework for monitoring trends in the future should be put in place. A good example of a one-off snapshot has recently been provided by Gameriro and Wilson<sup>ref 18</sup>. If a longer-term strategy is envisaged, this will need to complement the FAO strategy on the “Status and Trends Reporting in Fisheries”, already endorsed by COFI (Evans<sup>ref 19</sup>).

#### **4. WAYS IN WHICH THE TRANSITION TO RESPONSIBLE FISHERIES CAN BE FACILITATED, BEARING IN MIND THE DEVELOPING PARADIGM OF THE ECOSYSTEM APPROACH TO FISHERIES (EAF)**

In the third section of this paper, the manner in which that the transition to responsible fisheries can be facilitated is considered. Much of the work covered by the Working Party under recommendations A and B above will result in ways to facilitate this transition and more details concerning EAF are given in the document “Promoting the Ecosystem Approach to Fisheries in the Context of Small-Scale Fisheries”. The ACFR also provided considerable guidance on the way forward when it recommended:

- Under the guidance of a small steering committee, form cross-disciplinary teams to conduct case studies for a range of fisheries in developing and developed countries to learn how the ecosystem approach to fisheries can be used in practice, to help build capacity to use such an approach in different fisheries and to further develop the use of the approach.
- Using the case studies and other experience, build a toolbox of scientific and management approaches, including such tools as rapid appraisals, participatory research and data gatherings, conflict resolution tools, integrated resource management training, community-based and co-management, information sources, monitoring, evaluation and feedback.
- Disseminate the lessons learned from the case studies, make the tool box open, accessible and a source of knowledge and teaching through appropriate media (both face-to-face and through information technology).

FAO has now recently published their Technical Guidelines on the ecosystem approach to fisheries (EAF). EAF is the merging of the paradigms of ecosystem management and fisheries management in a fisheries context and, as such, seeks to address all issues relating to the management of a given fishery in a holistic manner, using a participatory approach. With complementary work being carried out using the Sustainable Livelihoods Approach (SLA), especially in countries where there is considerable experience and knowledge already built up, FAO can gain valuable experience which would be of assistance to all its members, especially developing countries.

In addition to the contents of the toolbox, more experience in policy analyses and institutional strengthening will be gained that will assist in directly building capacity in participating countries and also be of benefit to all through the dissemination of the toolkit.

Outputs/outcomes from such activities would include:

- a) EAF management plans for selected fisheries;
- b) staff and institutions of demonstration fisheries with improved capacity for EAF and implementation of IPOAs;
- c) annual performance reports for selected fisheries (triple bottom line – ecological, social and economic);
- d) summary of demonstration case studies – lessons learned;
- e) tool box of management approaches.

It is envisaged that many donors and partner agencies could be identified for this type of practical approach and that FAO should take the lead to start the initiative.

From a research perspective, another major issue which needs to be addressed to ensure a smooth transition towards responsible fisheries is the issue of implementing and applying research results. Over a period of many years, a range of authors have commented on the large gap between research providers and research users, especially in developing countries and this was the subject of a special paper during the Fifth Fisheries Development Donor Consultation held in Rome, Italy, 22-24 February 1999 (Cunningham<sup>ref 20</sup>). It is widely recognized that research has not contributed as effectively as it could have done to supporting improved fisheries management and poverty reduction. As far back as 1992, a study of international fisheries research concluded that research was largely “disengaged from the needs of national development objectives and from policy needs in general”.

Based on an analysis of the contribution of research to the sustainable livelihoods of artisanal fishing communities, Hussein and Zoundi<sup>ref 21</sup> identified the following actions to address this concern:

- strengthen the institutional, management and strategic planning capacities of socio-professional organizations in the small-scale fisheries subsector;
- strengthen or establish mechanisms for partnerships between research and fisheries communities;
- strengthen capacities of fisheries research institutions, and
- strengthen the contribution of fisheries research to policies and livelihoods(e.g. create liaison bodies bringing together representatives from research, policy makers and artisanal fishers.

In designing the Policy Advisory Programme (PAP) for the fisheries of Lake Victoria, the Strategy for International Fisheries Research (SIFAR) suggested that, in the long-term, a major improvement in the relationship between research and policy will probably need a change in the institutional arrangements and a change in the approach to research. It recommended the formation of an interface group to act as a facilitator between policy and research (a similar model has worked very successfully in Australia for a number of years). In its model the policy analysis would create a demand for certain types of information, which would be supplied by researchers. This information would certainly involve a greater emphasis on economic, social and institutional research and a greater participation of a full range of stakeholders in the research process, including developing research priorities, data collection and analyses and solutions for solving problems. This in turn would require more “action research” that would meet the client needs.

An important task of these liaison or interface units would be to explore and expand on the range of development narratives which underlie fisheries policy. For example, the standard narrative that explains that “increased fisheries production would lead to poverty reduction” could be countered by another narrative based on contemporary science that says “because natural systems all have an upper limit to their productivity, poverty reduction in fisheries depends on institutional change (e.g. more

co-management), a re-distribution of benefits and alternative employment opportunities, rather than production increases”.

Communicating science results requires the skills broader than those conventionally provided by fishery biologists who typically make up the bulk of the research organizations staff. Again the recommendations of the ACFR are relevant when they recommend the formation of multidisciplinary teams who would work with local counterparts in implementing the newly published EAF guidelines in a number of fisheries from developing and developed countries and then building a toolbox of appropriate management and science approaches. This could build on a number of field projects being implemented by FAO and partner agencies (e.g. SEAFDC). For example the ACP Fish II feasibility study being designed by FAO/SIFAR advocates the initiation of a structure to provide coordination, support and knowledge based on practical learning and capacity building. This could provide an excellent opportunity to provide a more “hands-on” capacity building environment based on learning and training to improve the fisheries management of a given range of demonstration sites.

The need for better communication and adoption of research should link strongly with the research agenda developed in the first recommendation, for without a way of implementing the new knowledge gained, any research agenda in the end simply becomes an academic exercise that may generate a large number of research papers but little else.

## REFERENCES

- <sup>1</sup> FAO. 2003. Paper COFI/2003/9 presented to the Committee on Fisheries, 25<sup>th</sup> Session – Rome, Italy 24-28 February 2003.
- <sup>2</sup> Béné, C. 2002. Poverty in small-scale fisheries. A review and some further thoughts. 1950 *In: Small-scale fisheries, poverty and the code of conduct for responsible fisheries. Report of an international workshop organized by CEMERE as part of the DFID/FAO Sustainable Fisheries Livelihoods Programme (SFLP) Cotonou. Benin. November 2001. FAO. Rome.*
- <sup>3</sup> Neiland, A.E. 2002. Fisheries development, poverty alleviation and small-scale fisheries: a review of policy and performance in developing countries since 1950 *In: Small-scale fisheries, poverty and the code of conduct for responsible fisheries. Report of an international workshop organized by CEMERE as part of the DFID/FAO Sustainable Fisheries Livelihoods Program (SFLP) Cotonou. Benin. November 2001. FAO. Rome.*
- <sup>4</sup> <http://www.johannesburgsummit.org/>
- <sup>5</sup> Macfadyen, G & Corcoran, E. 2002. Literature review of studies on poverty in fishing communities and of lessons learned in using the sustainable livelihoods approach in poverty alleviation strategies and projects. FAO Fisheries Circular No. 979, 93 pp.
- <sup>6</sup> FAO. 1999. Indicators for sustainable development of marine capture fisheries. FAO Technical Guidelines for Responsible Fisheries No. 8, 68 pp.
- <sup>7</sup> FAO. 1997. Fisheries management. FAO Technical Guidelines for Responsible Fisheries No. 4, 82 pp.
- <sup>8</sup> FAO. 2003. Fisheries Management: The ecosystem approach to fisheries. FAO Technical Guidelines for Responsible Fisheries No. 4, Suppl.2, 112 pp.
- <sup>9</sup> FAO. 2002. The State of World Fisheries and Aquaculture 2002. FAO Fisheries Department. FAO, Rome. 150 pp.
- <sup>10</sup> FAO. 1998. Integrated coastal area management and agriculture, forestry and fisheries. FAO guidelines, FAO Sustainable Development Department. FAO, Rome. 267 pp.
- <sup>11</sup> Coates, D. 2002. Inland capture fishery statistics of South East Asia: Current status and information needs. Asia Pacific Fishery Commission, Bangkok. Regional Office for Asia and the Pacific. Publication No. 2002/11, 114 pp.
- <sup>12</sup> Sielert, H. 2002. Regional synthesis on the current status of small-scale fisheries management in Asia. *In: Interactive mechanisms for small-scale fisheries management – report of the Consultation, Bangkok. 26-29 November 2001. Regional Office for Asia and the Pacific. Publication No. 2002/10.*
- <sup>13</sup> Tofique, K.A. 1997. Some observations on power and property rights in the inland fisheries of Bangladesh. World Development No. 25. pp. 457-467.
- <sup>14</sup> Jallow, A. 2002. The socio-economic impacts of different fisheries management strategies at local level. *In: Small-scale fisheries, poverty and the code of conduct for responsible fisheries. Report of an international workshop organized by CEMERE as part of the DFID/FAO Sustainable Fisheries Livelihoods Programme (SFLP). Cotonou. November 2001. FAO, Rome.*
- <sup>15</sup> Sverdrup-Jensen, S. & Nielson, J.R. 2002. Co-management in small-scale fisheries: A synthesis of Southern and Western African experience. <http://www.indiana.edu/~iascp/Final/raakjaer.pdf>
- <sup>16</sup> FAO & MRC. 2003. New approaches for the improvement of inland capture fishery statistics in the Mekong Basin. Ah hoc Expert Consultation. Udon, Thailand. 2-5 September 2002. 145 pp.
- <sup>17</sup> McGoodwin, J.R. 2001. Understanding the cultures of fishing communities. A key to fisheries management and food security. FAO Fisheries Technical Paper No. 401, 287 pp.
- <sup>18</sup> Gameriro, M.F.S & Wilson, J.D.K. 2003. The importance of marine fisheries to coastal community livelihoods in SADC countries. Final consultancy report. 12 pp.
- <sup>19</sup> Evans D.W. 2001. Status and trends reporting in fisheries. A review of progress and approaches to reporting the state of the world fisheries. FAO Fisheries Circular No. 967, 74 pp.
- <sup>20</sup> Cunningham, S. 2001. Towards the increased policy relevance of fisheries research. A discussion paper prepared for the Fifth Fisheries Development Donor Consultation. Rome. 22-24 February 1999. FAO Fisheries Circular No. 964.

- <sup>21</sup> Hussein, K & Zoundi, J. 2003. The contribution of research to the sustainable livelihoods of artisanal fishing communities. Overview and final report of a study conducted in West Africa (Cameroon, Guinea, Mali, Mauritania, Nigeria and Senegal). Cotonou. Sustainable Livelihoods Programme in West Africa SFLP/FR/14, 49 pp.

## **2. CONTRIBUTION OF SMALL-SCALE FISHERIES TO RURAL LIVELIHOODS IN A WATER MULTI-USE CONTEXT (WITH A PARTICULAR EMPHASIS ON THE ROLE OF FISHING AS “LAST RESORT ACTIVITY” FOR THE POOR)**

Christophe Béné

### **SUMMARY**

Since the mid-eighties, the importance of small-scale fisheries in rural development has been widely recognized by academics, practitioners and development agencies. However, despite an increasing number of research and development programmes, the role played by small-scale fisheries in the rural development of coastal or riverine area communities is still poorly understood. It is in particular widely recognized that a more systematic framework is needed which could help to better evaluate the real contribution of small-scale fisheries to the sustainable socio-economic development of rural populations in developing countries.

The present document is an attempt to contribute to this improvement. In particular, its main objective is to address the question of the “Role of small-scale fisheries in multiple use of coastal, estuarine and inland waters”. For this purpose, it relies essentially on an overview of the sectoral interactions between small-scale fisheries and the other rural activities and discusses how those interactions may affect the livelihood of fisheries-dependent populations in developing countries. A special emphasis on the potential role played by artisanal fisheries in poverty alleviation is made. For its largest part, the analysis is conducted from a Sustainable Livelihood Approach (SLA) perspective – although the principles of this approach are not detailed here.

The paper is articulated in four main sections, as follows. First, an overview on small-scale fisheries and livelihood of fisheries-dependent communities in developing countries is proposed. Using a livelihood analysis-based approach, we show how the contribution of fisheries to household livelihoods is not simply a function of the time (labour) involvement shared between the different members of the household but rather a function of the combination of fishing assets they have at their disposal (including the status of the local ecosystem and its fish stocks), and the rules and other socio-institutional mechanisms which govern the access and use of those assets. Combining the index of human involvement (investment of labour and/or human assets, e.g. skills) adopted in the conventional approach with an index of “capital” investment (physical and financial assets) allows us to build up a new two-dimensional framework which captures and illustrates in a more comprehensive way the very wide spectrum of contributions that fishing may offer as part of the households’ livelihood strategies.

Second, the paper presents and discusses the issue of water multi-use and its impact on fishing activity and fishery-dependent communities’ livelihoods. Based on a typology of interactions including 5 categories (conflict, neutral multi-uses, compromises, complementary uses and collaborations) we show through a series of case-studies that the water multi-use interactions taking place between the different water stakeholders are not systematically of conflictual nature. Of particular importance is the case of complementary interactions. The review of the literature reveals, however, that empirical studies analysing how these complementary interactions evolve are cruelly missing. The main reason for this gap is that fishery has been considered too frequently from a mono-sectoral point of view (both by scholars and deciders), despite the fact that the multiactivity-based livelihoods of most fisher-farmers of riverine or floodplain environments have been recognized for many decades. A series of conclusions are then derived, which identify domains of investigation for further research.

Third, the issue of valuation and information use in fishery policy is discussed. It is first recalled that the gap of knowledge and lack of proper valuation which characterizes small-scale fisheries in most parts of Africa, Latin America, and – to a lesser extent – Asia, is usually presented as the main constraint for the design of appropriate fishery policy, both at regional and national levels. It is argued however in this paper that this perception – which tends to explain the lack of appropriate policies and planning by the poor abilities of practitioners and academics to properly evaluate the true social and

economic values of small-scale fisheries-, hides another important dimension of the problem. The experience shows, indeed, that the generation of (more) information is not systematically a sufficient condition to support a more appropriate agenda setting and to ensure the implementation of successful policies. The impact of social/economic information generated through a better evaluation process is not merely determined by the quality of that information, but also to a large extent by the nature of the policy environment.

The second part of the section reviews the different valuation methods which are potentially applicable to the evaluation of artisanal fisheries, and discusses their respective rationales and limitations within a multi-uses, multi-users context. A specific emphasis is given in this review to the livelihood analysis approach, and in particular to how this recently developed approach fits into the more general socio-economic framework and how it may complete the other more conventional environmental economics methods.

Finally the specific question of poverty alleviation in small-scale fisheries is raised in the last section of this paper. More specifically, the role played by fisheries as an “activity of last resort” for the poorest is addressed and carefully discussed. First the prevalence of this paradigmatic perception is emphasized through a thorough review of the fisheries literature. Second a more in-depth analysis shows how this pro-poor capacity of small-scale fisheries to sustain poor people results in fact from the combination of two distinct mechanisms: (1) the “redistributive” dimension of fisheries, i.e. the fact that fishing activities appear very often to be of greater importance to the poor in terms of income, food security and employment than for the non-poor. Within this approach, fishing is considered as a fundamental “pillar” on which poor families facing chronic (long-term) destitution rely to sustain their livelihoods; and (2) the “safety-net” capacity of fisheries, i.e. the fact that in period of individual or collective economic crisis, fishing may also provide alternative or additional sources of income, employment and food for the households – poor and less poor – whose livelihoods have been temporarily reduced or affected by the crisis. Those two mechanisms are then analysed and discussed, and needs for further research associated to this role of “activity of last resort” are highlighted.

## 1. CONTEXT

Since the mid-1980s and, in particular, as a result of the works of Lawson (1977, 1983), Smith (1979) or Panayotou (1982, 1985), the role of small-scale fisheries in rural development in terms of food supply/security, income and employment has been widely recognized (see, e.g. FAO 1984, World Bank 1993). Drawing upon those initial works, a significant number of research and development programmes were implemented (mainly in Africa and Asia) in the 1990s which attempted to further investigate the importance of artisanal fisheries to the local populations (see for instance the multiple programmes carried out by the International Centre for Living Aquatic Resources Management (ICLARM) in Asia, the Integrated Development of Artisanal Fisheries (IDAF) programme implemented by FAO and the Danish International Development Agency (DANIDA) in West Africa, or the Traditional Management of Artisanal Fisheries (TMAF) programme funded by DFID in Nigeria). However, despite the great progress achieved through these programmes in describing and understanding the livelihoods of artisanal fishers, the position of small scale fisheries and how they fit into the more general, multi-activities rural economy remains poorly understood. It is widely admitted for instance that a more systematic framework (or strategy) is needed to better evaluate the real contribution of small-scale fisheries to socio-economic development of rural populations in developing countries (FAO 2000).

It is in this context that the FAO Advisory Committee on Fisheries Research (ACFR) recently recommended the establishment of a Working Party on small-scale fisheries. The objective of the Working Party is to make recommendations for the management of small-scale fisheries, including a set of Technical Guidelines, to increase the contribution of small-scale fisheries to food security and poverty alleviation on a sustainable basis. To support production of the guidelines, a series of background papers was commissioned to highlight issues and experiences in small-scale fisheries.

This document is part of this set of background papers. Its main objective is to address the question of the “Role of small-scale fisheries in multiple use of coastal, estuarine and inland waters” (Theme No.1 of the Terms of Reference). For this, it will rely essentially on an overview of the sectoral interactions between small-scale fisheries and the other rural activities and discuss how these interactions may affect the livelihoods of fisheries-dependent populations in developing countries. A special emphasis is placed on the potential role played by artisanal fisheries in poverty alleviation. The analysis will be conducted from an SLA perspective.

Throughout the paper, the discussion – although largely illustrated with empirical case studies – will be articulated mainly from a conceptual point of view and focus on research issues. This approach greatly limits the relevance of the paper with regard to the day-to-day tasks of practitioners (e.g. Department of Fisheries officers). The Terms of Reference also requested to restrict the analysis to the context of developing countries, which induces that some lessons or experiences achieved in more advanced, industrialized countries (especially those in the domains of integrated coastal management planning and coastal zone planning) will not be considered in this study.

The paper is articulated as follows. After an overview on small-scale fisheries and livelihoods of fisheries-dependent communities in developing countries (section 2), the paper will present and discuss a list of issues related to the multiple uses of marine, estuarine and inland waters (sections 3 and 4). Where possible the paper will link those issues to current knowledge (or lack of knowledge) and relevant future research areas. Finally the specific question of poverty alleviation in small-scale fisheries will be raised (section 5). In particular, the role played by fisheries as an “activity of last resort” for the poorest will be addressed.

## 2. FISHING AS A LIVELIHOOD ACTIVITY IN RURAL COMMUNITIES

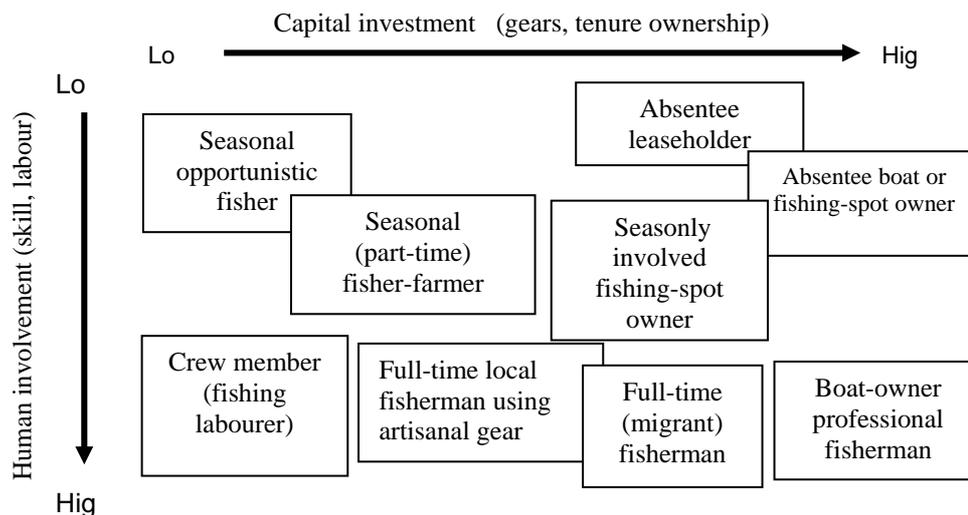
Worldwide, and in particular in developing countries, fisheries and fisheries-related activities (processing, trading, net-repairing, etc.) are a key-component in the livelihoods for millions of people. In West Africa, for example, it is estimated that over five million men and women depend on the use of aquatic resources for their livelihoods and millions more are highly dependent on the nutrition provided from fisheries and aquatic resources from coastal areas and extensive river and floodplain systems. In Asia the figures are even larger. In the Mekong delta only, more than 15 million people are estimated to depend on fisheries activities on a daily basis, either for income, employment or food

supply. The majority of these people live in rural (sometimes quite remote) areas, where the living standard is recognized to be usually low or very low.

### Analytical framework

It is usual to divide fisher households according to their degree of labour-involvement in fishing activities, and based on the conventional classification: professional, part-time and occasional fishers. However, such a division merges households that may have completely different livelihood strategies, and for whom fishing activities may play a completely different role within the overall range of activities undertaken by those households. This loss of socio-economic differentiation among fishing households can be analytically disabling, particularly when poverty is the primary concern.

Using the SLA approach could help to show how the contribution of fishing to household livelihoods is not simply a function of the time (labour) involvement shared between the different members of the household but rather a function of the combination of fishing assets they have at their disposal (including the status of the local ecosystem and its fish stocks), and the rules and other socio-institutional mechanisms that govern the access and use of those assets. From this SLA perspective, it is, therefore, necessary to 'widen' the approach through which the place of fishing activities in households' livelihood is analysed. This can be done by combining the index of human involvement (investment of labour and/or human assets, e.g. skills) adopted in the conventional approach with an index of 'capital' investment (physical and financial assets)<sup>1</sup>.



**Figure 1. Typology of fishing activities as a function of human involvement (skills, labour) and capital investment (gears, tenure ownership or leasing).**

Using this approach, a new two-dimensional framework can be built up, which captures the very wide spectrum of contributions that fishing may offer as part of household livelihood strategies (Fig.1). These strategies may range from low human (labour) involvement combined with low capital investment, to a highly intensive labour activity and/or highly capital-based activity. Between those two extremes, a continuum of combinations exists which provide opportunities to thousands of people to include fishing activity as part of the overall range of activities they undertake to sustain their livelihoods.

### Small-scale fisheries and rural livelihood strategies

The combination of low human involvement and low capital investment (top-left corner of Fig.1) corresponds to the strategy of opportunistic fishing undertaken by a very large number of households

<sup>1</sup>This part is derived from an initial analysis proposed by MRAG (2001).

in developing countries, essentially for subsistence purposes<sup>2</sup>. This strategy involves cheap and simple fishing gear (e.g. baited fishing lines) and is frequently carried out by “non-leading” members of the household (children or elders, or sometimes adult women) in addition to the other domestic activities. This type of fishing is usually operated in an opportunistic way on the margins of the water-bodies located in the vicinities of the house/village. The purpose is almost exclusively for subsistence. In floodplain areas of the Indian subcontinent, this type of opportunistic activity may involve up to 70-80 percent of the households during the flood season (Thompson and Hossain 1998; Hoggarth *et al.* 1999). In West African villages on the coast, or in the vicinity of rivers (e.g. Cameroon, Burkina Faso) or lagoons (e.g. Benin, Ivory Coast), opportunistic (morning and/or evening) fishing, with other activities such as farming, household or agricultural commitments occupying the rest of the day, is very common (Horemans and Jallow 1997, Williams and Awoyomi 1998).

Seasonal (or part-time) fishing is usually characterized by a slightly higher labour and financial involvement. It is also operated by different members of the households: part-time fishers are young and/or mature males who get involved in fishing activities as part of a wider, multi-activity livelihood portfolio. They usually use relatively cheap and simple fishing gears (e.g. traps, gillnets, hook lines) although some more ‘sophisticated’ gear or techniques (e.g. fences or barriers) may be used as well. This type of activity can last from a few weeks to several months during the season, depending on the combination of activities undertaken by the households and the availability of labour and resources. The catch is used for subsistence purpose or/and sold on local markets. In Africa, along rivers or in the vicinity of water-bodies (ponds, reservoirs) the active males may get involved in this type of seasonal fishing activity between crops or when other agricultural activities are low (Thomas and Adams 1999, Sana 2000). In the Tonle Sap Lake area in the Mekong Basin, hundreds of thousands of households share their time between the fishing activity, operated on the open water of the lake and the fringing floodplains during the rainy season, and the cultivation of rice paddy and other subsistence and cash crops during the rest of the year (Ahmed *et al.* 1998).

In coastal areas, people may enrol as crew members on boats for a given part of the year, depending on the opportunities (or absence of opportunities) in other rural activities. This category of wage-based labourers, however, involves mainly full-time professional fishermen (young and/or mature males) who are working all year round on artisanal or semi-industrial vessels (Chaboud and Dème 1989, Chauveau, Jul-Larsen and Chaboul 2000). Their revenues are usually based on a share-contract remuneration system and the activity is mainly undertaken for income generation (although some part of the revenue may be paid in kind). This concerns a large number of men in coastal villages (or even urban areas) in Africa (e.g. Senegal, Ghana) or in Asia (e.g. Sri-Lanka, Philippines, Thailand, Viet Nam). Other members of the household may be involved in fishing-related activities (e.g. fish scaling, processing, trading) or other urban or rural activities (farming, home gardening or livestock rearing).

In small islands (e.g. Pacific or Caribbean), or in inland areas (around rivers, lakes or reservoirs), full-time local (resident) fishermen constitute a very large share of village populations. In East-Africa lake fisheries their number has been estimated to be several million. In coastal areas they also represent a large majority of the males who are not enrolled as crew-members. These full-time resident fishermen usually possess their own artisanal fishing gears and, for the most successful of them, one (man-powered or sometimes motorized) canoe or pirogue. They sell the largest part of their catch to local markets, although a share is usually kept for household consumption. In inland areas, conflicts are frequent between these fishermen and migrant full-time fishermen who usually operate on the same water-bodies and compete for the same resource(s) (Faye 1994, Kassibo 2000). These migrant fishermen, who have usually very efficient gears and high level of fishing skill, are generally the main vector of technological transfer in those remote areas. In the Lake Chad region for instance, the *goura* (or Mali trap) which can be used either as an individual device (trap) or in aggregation to form barriers across rivers or channels was introduced in the early 1980 by migrant fishermen from Mali (Quensière, pers. comm.).

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<sup>2</sup> In this document subsistence refers to an economic system adopted by households primarily organized around a domestic mode of production which depends heavily on natural resource harvesting and mainly geared towards home-consumption (i.e. not commercialised and therefore not income-generating).

At the end of the spectrum, characterized by high human involvement and high financial investment, are the professional fishermen who possess their own fishing gear and their own boat. They may operate individually but usually employ one or several crew-members (relative or non-relative males). This category of professional fishers is very heterogeneous ranging from the poor individual full-time fisherman on the Amazon river's tributaries who hardly makes enough profit to feed his family (Hartmann 1989) to the "Big Man", sort of fishing entrepreneur along the coast of Senegal or Congo who employs a dozen of men on 10-m pirogues and is connected to a well-developed, efficient (and sometimes international) commercialization system (Nguingiri 2000).

Finally, high capital investments can also be combined with low human (labour) involvement (top-right). This is the case for owners of boats or expensive fishing gear (e.g. large beach seine) or individuals who have gained the control over the best 'fishing-spots' but are not directly involved in fishing activities. This category also includes absentee (local or urban) leaseholders who sublease their fishing rights, or contract local community fishermen. This situation can occur in marine and freshwater habitats (for boat owners), but is mainly found in floodplain areas where the spatial and seasonal heterogeneity of the habitat creates good "fishing-spots". The access to those very productive grounds (e.g. receding channels) is often restricted to the well-connected, better-off households, either institutionally -through asymmetric power-relationship – or economically – due to the very high entry cost (fees) which makes them unaffordable for the non-rich. Examples of such situations have been extensively described for Bangladeshi, Cambodian or Nigerian floodplains (e.g. Kremer 1994, Toufique 1997, Degen and Thuok 1998, Neiland, Jaffrey and Kudaisi. 1997).

In summary, the contribution of fishing activities to the livelihoods of rural poor and non-poor households may take a remarkably large number of various forms and involves a variety of different strategies. The use of the two indexes (human involvement and capital investment) represents, in that respect, an improvement over the more conventional approach which tends to characterize fishermen only by their degree of labour-involvement (professional, part-time and occasional).

However, as emphasised in the case of the full-time boat owner fishermen above, the degree of human and financial investments does not necessarily "explain" by itself the level of success (or failure) of the household and the extent to which involvement in fishing activities contribute to a household's well-being.

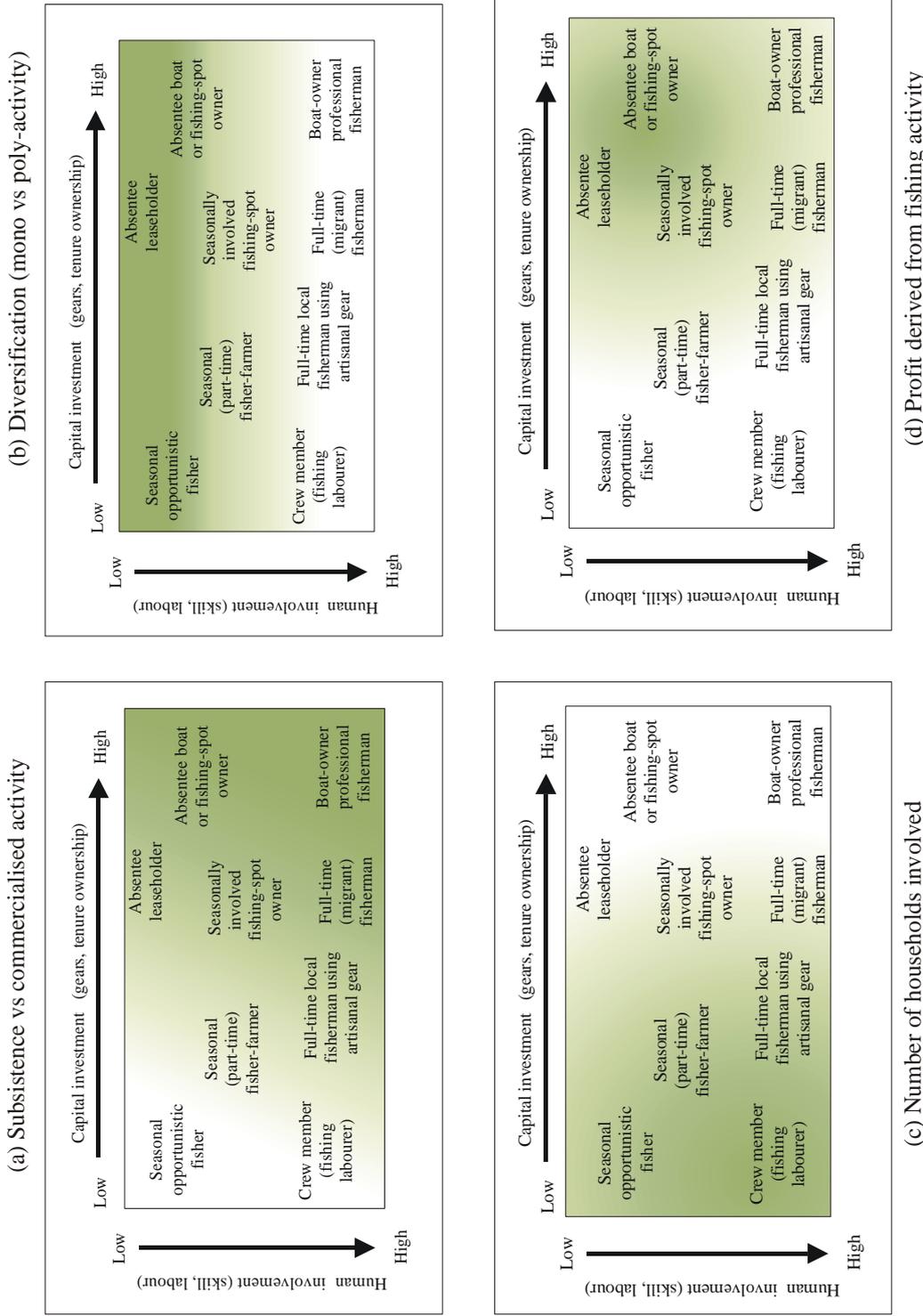


Fig.2. Characterisation of small-scale fisheries using four attributes: (a) subsistence vs commercial activity, (b) the degree of diversification characterising the fishing households' livelihoods, (c) the number of households involved in fishing strategies worldwide, and (d) the profit derived from fishing activities.

**Further characterization of small-scale fisheries**

Four additional analytical “entry-points” can be included in the initial framework to complement the characterization of small-scale fisheries with respect to poverty alleviation and food security (Fig.2). These characteristics are: the occurrence of subsistence vs. commercialized activity (top-left diagram), the various degree of diversification (mono vs. multi-activity) characterizing the livelihoods of the fishing households (top-right diagram), the number of households involved worldwide in the different categories of fishing strategies (bottom-left diagram), and the degree of profit (financial return)

derived from those fishing activities (bottom-right diagram). These features have been superimposed on the initial framework through gray scale shading gradients.

(a) In the top-left diagram, the occurrence of subsistence fishing (light shading) is represented along with the expansion of commercial fishing (darker shading). The review of the current literature suggests that the current marketization of the activity tends to restrict the occurrence of (pure) subsistence to the cases of low involvement and low investment activities. When human involvement and capital investment both increase, the degree of dependence on subsistence tends to decrease and an increasing share of the catch is commercialized.

(b) In the top-right diagram, the coloured pattern differentiates the mono (light shading) vs. poly-activity strategies (darker shading) adopted by the households involved in fishing. The shading illustrates that the level of financial investment is not a key-factor determining the degree of diversification at the household level. Both strategies – specialization (mono-activity) and diversification (poly-activity) – can be observed indifferently with low or high financial investment.

(c) The bottom-left diagram simply illustrates that the majority of the people (men, women) involved in fishing activities are occasional opportunistic fishers, seasonal fisher-farmers or fishermen who do not own their own boat (FAO 2003). On the other side of the spectrum, absentee leaseholders and households controlling or owning expensive fishing gears or fishing spots are comparatively very few.

(d) In the bottom-right diagram, the gradient illustrates the level of financial return derived from fishing activities (the light shading indicating low returns while darker shading shows high profits). The gradient is horizontal, indicating that the level of return is largely determined by the degree of financial investment and not by the level of human involvement. Those who can afford expensive gears or are socially or financially able to pay the formal and/or informal fees required to control highly productive fishing grounds are more likely to receive a higher return<sup>3</sup>.

The comparison between this last entry-point (d) accumulation of profit and (c) -number of people involved in fishing activity is important from a poverty alleviation point of view. The opposition of gradient between the two cases suggests that for a very large majority of fishery-dependent households in the world, fishing activities cannot be considered as a potential source of high economic return. This contrasts with the fate of a few households who control the highly profitable part of the activity and for whom fishing represents a source of substantial capital accumulation<sup>4</sup>.

### **3. THE ISSUE OF WATER MULTI-USE AND ITS IMPACT ON FISHING ACTIVITIES**

Water, by its very nature, is a multi-use good. Notwithstanding its cultural dimensions, water is used for human needs (drinking water, domestic uses), economic activities (agriculture, irrigation, fishing or aquaculture, transport, hydroelectric power, etc.) or even as a depository for domestic or industrial wastes. Even if rigorous comparisons are difficult, an overview would rapidly indicate that coastal, estuarine, or inland areas do not face “equal” situations in terms of water multiple-use issues. Broadly speaking, the different elements and mechanisms influencing the degree of interaction between two or more water-related activities can be “encapsulated” into two major components: (1) the multiplicity of uses and (2) the degree of intensity of those uses.

<sup>3</sup> For illustration Kremer (1994) calculated that in the floodplains adjoining the River Meghna in North-east Bangladesh, during the receding season, the richer fishing households using very efficient and costly fishing techniques catch 2.5 times more fish by weight per household than their poorer counterparts.

<sup>4</sup> For illustration, in Cambodia where the fisheries of the Tonle Sap Lake has been estimated to support more than 1.2 million people, a recent FAO study revealed that in the year 2000, 80 percent of the dry season shoreline of the lake was controlled by only 18 men (Evans 2003).

**Table 1. Multi-use of water in coastal, estuarine and inland areas**

	Inshore salt water	Estuarine environment brackish-water	Inland areas fresh water
Direct uses	<ul style="list-style-type: none"> <li>· Fishing activities</li> <li>· Tourism activities (diving, sailing, etc)</li> <li>· Recreational activities</li> <li>· Mineral extraction</li> <li>· Transport</li> <li>· Coastal aquaculture</li> </ul>	<ul style="list-style-type: none"> <li>· Fishing activities</li> <li>· Brackish water aquaculture</li> <li>· Transport</li> <li>· Recreational activities</li> <li>· Mineral extraction</li> </ul>	<ul style="list-style-type: none"> <li>· Fishing activities</li> <li>· Fresh-water aquaculture</li> <li>· Domestic uses (drinking, washing)</li> <li>· Livestock</li> <li>· Agriculture (irrigation)</li> <li>· Power generation (electricity)</li> <li>· Transport</li> <li>· Dams</li> <li>· Mineral extraction</li> <li>· Recreational activities</li> <li>· Flood control</li> <li>· Water transfers</li> </ul>
Indirect uses	<ul style="list-style-type: none"> <li>· Domestic and industrial discharges</li> <li>· Conservation (protected area)</li> <li>· Urbanization</li> </ul>	<ul style="list-style-type: none"> <li>· Domestic and industrial discharges</li> <li>· Conservation (protected area)</li> <li>· Urbanization</li> </ul>	<ul style="list-style-type: none"> <li>· Domestic and industrial discharges</li> <li>· Conservation (protected area)</li> <li>· Urbanisation</li> <li>· Forestry</li> </ul>

### 3.1 Multiplicity of uses

Globally, even if it is difficult to draw any pertinent generalization due to the very local-specificity of water multi-use interactions, some trends can be identified. In particular, the number of direct and indirect uses globally increases from coastal (inshore) to estuarine areas (including river delta, mangrove, lagoon, etc.), and from estuarine to inland areas (rivers, reservoirs, lakes, ponds, floodplains) (Table 1). This increasing trend essentially reflects the fact that all direct uses, except power generation and transport, are strongly related to the salinity degree of the water in the area considered – salt water in coastal area; brackish-water in estuarine environment; and freshwater in inland areas – and in particular that animals, human beings, and most agricultural plants need fresh water for their development.

### 3.2 Intensity of use

The major driving forces determining the intensity of water use are: (a) population pressure and (b) degree of economic development. Population pressure varies from one continent (country) to the other. A comparison between Asia and Africa for instance is almost meaningless, given the tremendous difference that exists today between those two continents in terms of population density (203 vs. 64 person/mile<sup>2</sup> respectively). This difference is further exacerbated by the discrepancy in economic development.

Within continent (or country) the intensity of water-use also varies between inshore, estuarine and inland areas. In most places, estuarine waters are usually characterized by high population density (e.g. Mekong delta, delta of the Ganges, Nile delta) and therefore is likely to be characterized by the highest intensity of use, followed by inland and coastal waters.

### 3.3 Pattern of interactions

The combination of multiplicity and intensity of water-use is the key element conditioning the degree of interactions between stakeholders. These interactions are the mechanisms which impact, either positively or negatively, upon the communities' livelihoods. Potentially, multi-use conflicts can occur between any of the activities listed in Table 1.

Most of the water multi-use interactions taking place between stakeholders (especially at the intra-household or intra-community levels) are not, however, necessarily of conflictual nature. Yet,

very often, those interactions are perceived, presented and analysed within the restricted framework of conflict (or conflict resolution) analysis (e.g. Nickum and Easter 1990, Charles 1992, Blench 1996).

Other categories of interactions are possible. Four are used in addition to conflict in a typology (Table 2) to illustrate the more complex nature of multi-use interactions. Those include (along with conflict) neutral multi-uses, compromises, complementary uses and collaborations.

The typology also makes the distinction between multi-*uses* and multi-*users*. Multi-*uses* interactions may be experienced by the same individual/household/user group, while multi-*users* interactions occur by definition between different user-groups. In both cases, the users can be affected positively or negatively by the interaction(s).

### 3.3.1 Conflict of usages

*Conflicts of usages* between fisheries-dependent communities and other water-users are widespread throughout the world and greatly affect coastal, estuarine or inland fisheries. However, as noted previously, inland fisheries, because they compete with a larger number of other types of usages, are likely to be very often at the epicentre of those multi-use conflicts. In this respect, fishing communities appear to be frequently amongst the “losers” of these conflicts, due to the low priority that this activity is usually given by national (or even local) planners but certainly also due to the general lack of political power and/or voice that characterize these communities.

One very frequent and many times reported scenario which illustrates this type of conflict of usages is that which opposes irrigation schemes and fisheries. It is widely admitted that the productivity and diversity of inland aquatic resources may be strongly affected by the development of water resources for irrigation.

An illustration of this is the situation experienced by the Mousgoum communities of the Yaéré floodplain along the Logone river in North Cameroon (Béné *et al.* 2003a). Here the local populations have developed a complex livelihood strategy where fishing plays an important role both in terms of food security and generation of income.

**Table 2. Typology of multi-uses and multi-users interactions**

Type of interactions	Multi-use interactions	Multi-users interactions
<ul style="list-style-type: none"> <li>▪ Conflicts</li> </ul>	Conflict of usages: situations of negative externalities: the use of unit(s) of water (as a resource itself or as the vector of the resource, e.g. fish) by one activity/sector is affecting other users.	Stakeholder conflicts: Situations of competitions for the access to, or oppositions of interests about water-uses between two (or more) stakeholder groups.
<ul style="list-style-type: none"> <li>▪ Neutral multi-uses</li> </ul>	Neutral multi-use: situation where one type of water use does not affect another type of use.	
<ul style="list-style-type: none"> <li>▪ Compromises</li> </ul>		Stakeholder compromise: Situations of trade-offs – a trade-off is the process of balancing conflicting objectives- between two (or more) stakeholder groups.
<ul style="list-style-type: none"> <li>▪ Complementarities</li> </ul>	Complementarity of uses: situation where the use of water in one sector/activity may have positive outcomes in other activities/sectors.	
<ul style="list-style-type: none"> <li>▪ Collaborations (or consensus)</li> </ul>		Stakeholder collaboration: Situations of active agreement – materialized through alliance, partnership or association- between two (or more) stakeholder groups.

In 1979, however, a national irrigated rice-growing project was constructed under the management of the state-controlled company SEMRY (Rice Culture Expansion and Modernization Authority). The objective of the project was to control flooding of the adjoining floodplain and to allow the culture of irrigated rice through the construction of 28 km of embankments, plus some 80 km of dykes along the Logone River. These irrigation schemes seriously modified the hydrological regime in the entire floodplain, leading to an acceleration of the degradation of the environment which had been initially caused by the 1970-80s Sahelian drought. In particular these modifications eliminated the flooding of some 59 000 ha of floodplain and seriously reduced another 150 000 ha which were important breeding and nursery areas for fishes. Using simple calculations, and taking into consideration the catch losses induced by the flood reduction, Neiland and Béné (2003) estimated that this irrigation scheme induced a direct lost of US\$ 120 million (first sale value) for the local community over the 21 years during which the flooding pattern was significantly affected (1979-2000)<sup>5</sup>.

### 3.3.2 *Stakeholder conflicts*

As for the conflicts of usages above, the number and type of *stakeholder conflicts* that can potentially break out between fishing communities and other stakeholders are almost endless. Those types of conflicts are likely to occur in inland and estuarine environments where the number of different stakeholders other than fishing communities involved in water uses is large (e.g. herders, farmers). But these stakeholder conflicts can also occur in coastal inshore waters, even if the groups or communities which share the resources are less numerous. One classical example is the conflicts of interest between fishing communities and tourism activities. In the Caribbean, where marine tourism is well developed, the different activities (scuba-diving, sailing, jet-skiing) undertaken by tourists, either individually or through operators may interfere with fishermen activities. On the Island of Providenciales in the Turks and Caicos archipelago (British West Indies), for example, demographic pressures from a rising number of tourists is now reported to impact heavily upon fishing activities (artisanal conch and lobster fisheries). Providenciales relies mainly upon the tourist industry for employment and income, and fishing is becoming much less important. As the tourist industry expands, so too does the pressure on the coastal zone as divers, swimmers, water skiers and jet skiers vie for space. The waters are zoned and several marine parks have been created around the island in areas which initially did not overlap too severely with fishing grounds. However, dive operators competing with each other and seeking for ever more unspoilt and quiet dive sites are now reported to be encroaching on fishing grounds outside the parks, creating conflict with the artisanal fishermen (Bennett *et al.* 2001).

### 3.3.3 *Stakeholder compromise*

Conflicts between fishing communities and other users of waters are not unavoidable, even in the case of apparent competition for the same resources. *Compromise* is another possible type of outcome. The example used here to illustrate this type of interaction is the arrangement which was found between the Levuka fishing communities of the Makogai Island (Fiji) and the local authorities (Fisheries Division) on the creation of a protected marine reserve. Generally, in the Pacific Islands, where at least some vestiges of traditional marine tenure systems persist (Ruddle 1993), fishing areas are finely subdivided between villages, clans or families, and it is relatively difficult for one or more of these units to give up their holdings. In the case reported by Adams (1998), the Levuka people “owned” fishing rights around a series of islands which were felt to be a good site for protection of giant clam re-seeding experiments carried out by the local government-run hatchery. The Fisheries Division proposal to create a protected area was not initially well received, due mainly to worries about the ultimate ownership and control of the area. After several rounds of negotiation, a final agreement was reached in 1990, and then renewed in 1992. The key issue is that the protected area was not defined in *de jure* legislation but maintained in practice by formal written agreement, ratified in the traditional way, between the Tui Levuka (the traditional local leader) and the Minister responsible for fisheries. The reserve area is not entirely banned to fishing, but fishing pressure is sporadic and minimal, and a complete fishing ban is imposed both for the giant clams and the turtle nesting area on the shore. Subsistence fishing is held in abeyance except for certain special occasions agreed in advance between parties. Adams (1998, p. 134) who evaluated the case concluded: “*Significantly, the fishing rights to*

<sup>5</sup> In 1993, IUCN started a rehabilitation project in the area. The main objective was the restoration of the flooding area to a level close to the pre-dam conditions. This was to be achieved by the opening of the dyke at two different locations in 2000.

*the area have not been extinguished and it is this government-community compromise with limited objectives that has enabled the area to become probably Fiji's most effective marine conservation area"* (emphasized by C. Béné).

### 3.3.4 *Neutral multi-uses*

*Neutral interaction* refers to situations where two or more water-dependent activities undertaken simultaneously do not seem to impact on each other directly. Examples of neutral multi-uses are relatively sparse in the literature, although they may be more frequent in reality. The reason for this relative overlook is the fact that, due to their apparent neutral impact, these types of interaction do not attract much attention: they are neither totally negative (conflicts) nor overall positive (complementarity or collaboration), and stay therefore outside the usual "success and failure" framework adopted by scholars and/or practitioners to analyse natural resource use(r)s interactions. The very few cases trying to describe neutral interactions are therefore quite valuable for the original information they offer.

The example presented below is even more enlightening because it addresses this issue in a case where highly conflicting interactions are usually expected to occur, namely between inland fisheries and irrigation (see the section "conflicts of usage" above). In rural areas of the developing world, irrigation is indeed recognized as the single most important intervention impacting fisheries (World Commission on Dams (WCD) 2000). Irrigation systems may abstract and deplete (through evapo-transpiration) a large proportion of the annual flow from tropical river basins, and reduce the overall availability and ecological connectivity of aquatic habitats. However, at the same time, it is (less frequently) recognized that rain-fed rice paddies designed to store water for extended periods, can create aquatic ecosystems with many similarities to natural floodplains. Like floodplain habitats, paddies are colonized by fish during the wet season and contribute substantially to the overall fisheries production of the river-floodplain system.

Recently, Nguyen Koa and her colleague conducted a series of quantitative surveys in the rice-based farming system of Southern Laos to evaluate the impacts of small- to medium-sized weir and dam irrigation schemes on local fisheries. They showed that dam schemes caused no significant overall decline in catches, but a very significant re-distribution of catches and effort into the newly created reservoirs. In both weir and dam schemes, changes in catch were largely explained by changes in fishing effort. No significant impacts on fish species richness were detected. The authors concluded: "*rather than being fundamentally degraded as often assumed, fish populations and the fisheries they support can remain productive and diverse within irrigated rice systems*" (Nguyen Koa *et al.* 2003).

### 3.3.5 *Complementarities*

Empirical analyses of potential *complementarities* between water multi-uses, and especially between fishing and other rural activities at the household level, are sadly missing. The main reason for this gap is that fishing has been considered exclusively from a mono-sectoral point of view for many decades, despite the fact that the multiactivity-based livelihoods of most fisher-farmers from river or floodplain environments in Africa or Asia has been recognized for a long time both by practitioners and academics (e.g. Monod 1928). As a consequence, very few empirical studies have been carried out with the explicit objective of trying to evaluate the exact contribution of each of those activities to the households' livelihood. Some noticeable exceptions in the African floodplain context are Neiland *et al.* 1994, and Béné *et al.* (2003a; 2003b); and Barr (2000) in Bangladesh. All these field studies were, to some extent, based on the main principle of the Sustainable Livelihood Approach<sup>6</sup>; in contrast with other studies, they were based on a trans-sectoral, holistic approach, using activity ranking and wealth ranking analyses.

Overall, the main conclusion of these analyses was that the contribution of fisheries to households' livelihood varies greatly depending on the household's wealth (or symmetrical poverty). No generalization across or even within communities is possible, and the widely accepted perception that

<sup>6</sup> Even if the study by Neiland *et al.* (1994) was conducted years before the formal SLA framework was developed, these authors had already recognized the necessity to adopt a multi-sectoral approach.

“fishermen are the poorest of the poor” may be misleading in a large number of cases (see Béné, 2003) for a more in-depth discussion on this point.

From these studies, a whole set of issues were identified which need further investigation, especially in relation to the possible role of fisheries in poverty alleviation. In the African floodplain context the following key issues were highlighted:

*Fisheries, poverty, and wealth stratification:*

Access to fishing activity and/or fishing grounds is largely determined by a household’s wealth level. However, at the same time, fishing activities contribute to a large extent to wealth differentiation. These two mechanisms tend to reinforce each other and suggest that fishing is not systematically a good “leverage” for poverty alleviation. This last point is in agreement with the results presented in Fig.2 (c) and (d).

*Fisheries and livelihood diversification:*

Fishing can contribute to a households’ livelihood diversification through a wide variety of ways. This ranges from the “diversification for survival” strategy adopted ex-post by households in the case of temporary environmental and/or socio-economic crisis, to the “diversification for accumulation” strategy generally developed ex-ante by better-off households. The “diversification for survival” strategy is closely related but different from the “activity of last resort” which is generally assumed to characterize fisheries (see section 5 below on this point).

### **3.3.6 Collaboration (consensus)**

The last type of multi-user interaction is *collaboration* (or *consensus*). Like conflict situations, consensus scenarii have received considerable attention, not necessarily because they are more common than other types of interactions, but rather because they are the success stories from which “good lessons and practices” can, in theory, be derived.

One particular example which illustrates these collaborative interactions between stakeholders involved in water multi-uses, is Community-Based Ecotourism Management (CBEM). Generally, CBEM projects are based on initiatives managed by the local communities relying on ecosystem goods and services to improve their socio-economic status. Successful CBEM case studies show that the main challenges are minimization of impacts, benefit sharing equity and integrated national policies for rural development. In a recent study, Foucat (2002) assessed the sustainability of the ECBM project of the village of Ventanilla, south Pacific coast of Mexico. The households of this poor rural community, which used to make their living from the exploitation of sea turtle, were heavily impacted by the turtle hunting ban imposed in 1992 by the federal government. The community was then forced to search for new sources of income. With the initial help of a local non-governmental organization (NGO), and then the collaboration of governmental organizations (including one University, the Ministry of Environment and the Marine Turtles Mexican Centre), the local community successfully developed a series of eco-tourism activities within an appropriate local institutional framework (creation of a cooperative to manage the benefits of the activities). The case study shows how such a type of collaboration ensured the economic and social viability of the project. The CBEM now generates the largest part of the income of the households belonging to the cooperative, which complete their revenues with subsistence agriculture and fishing.

## **3.4 Multi-uses of water: implication for research**

From this general overview, a series of conclusions can be derived which highlight the need for further research.

- In developing countries, due to past (and still existing) over-emphasis on mono-sectoral approaches, analyses of water multi-uses and water multi-users’ interactions are rare.
- The mechanisms which condition the outcome of interactions between different uses and different users of water remain obscure. As illustrated by the examples above, the interactions between fisheries and irrigation schemes may be detrimental (Yaéré case) or neutral (Southern Laos). Similarly, the interactions between fisheries and tourism activities may be conflictual (Turks and

Caicos Islands) or lead to collaborative initiatives (Ventanilla CBEM project). We are, however, far from reaching a complete understanding of the complexity and richness of interactions which bind fishing activities to the other water user activities at the household or community levels. A similar conclusion holds at the regional and national levels for water multi-uses and/or multi-users policies and planning. There is in these domains an urgent need for the development of adequate analytical frameworks to implement cross-sectoral analyses.

- Success or failure stories are only part of the overall picture. A large number of empirical situations do not fall into those two clear-cut “theoretical” categories, but are located somewhere along a spectrum of more complex and constantly evolving interactions. Figure 3 attempts to highlight this point. The figure illustrates in particular that, except for some studies on conflict resolution (compromise) carried out recently and mainly based on developed countries’ experiences (e.g. Hart and Pitcher 1998) little research has been conducted so far to understand complementary interactions (both at the local household, community, and national levels) in the specific context of developing countries.
- Lessons can be drawn from water multi-uses and multi-users interactions. But to generate valuable conclusions, (a) the work would require a large-scale, rigorous research programme implemented on an international, multi-disciplinary, and more fundamentally multi-sectoral, basis – the worldwide collaborative Challenge Programme on Water and Food co-ordinated by the Consultative Group on International Agricultural Research (CGIAR) is a possible example of such collaborative set-up between different research institutions (CGIAR 2002); (b) these analyses should not simply focus “in a static manner” on the success or failure scenarios and on the factors which explain those successes or failures but rather analyse, in a more “dynamic” manner, the socio-institutional and economic factors (including policy impacts) which constrain or facilitate the move along the interaction spectrum.

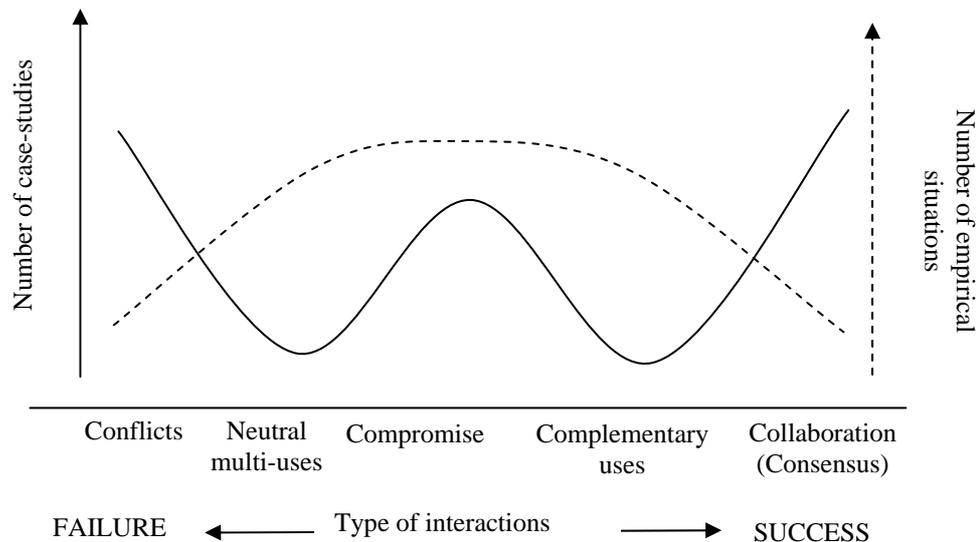
#### **4. THE ISSUE OF VALUATION AND INFORMATION USE IN FISHERY POLICY**

##### **4.1 General context: an urgent need for better valuation of fishing activities**

The conclusion highlighting the poor understanding of the complexity of water multi-use and multi-user interactions also holds for the contribution of fishing activities to economic development and poverty alleviation. Very little has been done (especially in comparison to other rural activities, such as farming or forestry systems) in these domains. It is for instance widely admitted that in most parts of Africa and Latin America, and to a lesser extent in Asia, it is currently extremely difficult to make any accurate and up-to-date assessment of the economic value of small-scale fisheries activities (Neiland 2003, Cowx 2003). Similarly, a large number of recent work underlines the great potential of small-scale fishing activities for economic development (both at local and national levels) but systematically highlights how poorly the true (economic) value of this sector is reflected in official statistics and discussions on food security and livelihoods (e.g. European Commission 2000, Kaczynski and Looney 2000, Anon. 2001).

This knowledge gap and lack of proper valuation is usually presented as the main constraint for the design of appropriate fishery policy at both regional and national levels. Recently, in relation to research activities in the Mekong Basin, a DFID document emphasized:

*“...the failure to understand the value of the river in its ‘natural’ state, and of the variety of economic, ecological and livelihood benefits that rivers and floodplains can deliver, is seen as a weakness in major policy decisions related to large-scale basin development projects” (DFID 2001).*



**Figure 3. The current mismatch between research focus (solid line) and empirical situation (dashed line) in the domain of water multi-use situations.**

Furthermore it can also be argued that an additional reason for explaining why policy related to river-use and conservation is weak is that the ecological “values”, i.e. ecological ecosystems “services” provided by rivers is in general poorly understood. The term “value” does not therefore just relate to economic value but also to a wider understanding of the importance of fisheries in maintaining ecosystem services.

Faced with this lack of information, not only national policy-makers and planners, but also international development agencies, are severely constrained in their ability to formulate and implement rural development policies appropriate for, and adapted to, the sector.

This perception – which tends to explain the lack of appropriate policies and planning in small-scale fisheries by the poor abilities of practitioners and academics to properly evaluate the true ecological, social and economic values of small-scale fisheries, hides, however, another important dimension of the problem. Experience shows that the generation of (more) information on the economic and/or social values of small-scale fisheries is not a sufficient condition to support more appropriate agenda-setting and to ensure the implementation of successful policies. The impact of social/economic information generated through a better evaluation process is not merely determined by the quality of that information, but also to a large extent by the nature of the policy environment. In other terms, better (or more accurate) valuation is not necessarily the solution to the problem. One can indeed identify some special circumstances where the generation of more information would have no tangible effect on the well-being of (local) populations, unless the general policy context within which this information is “injected” is properly understood, and the alternative usages affecting the water resources genuinely evaluated<sup>7</sup>.

These remarks highlight two distinct but complementary domains where further research activities need to be engaged.

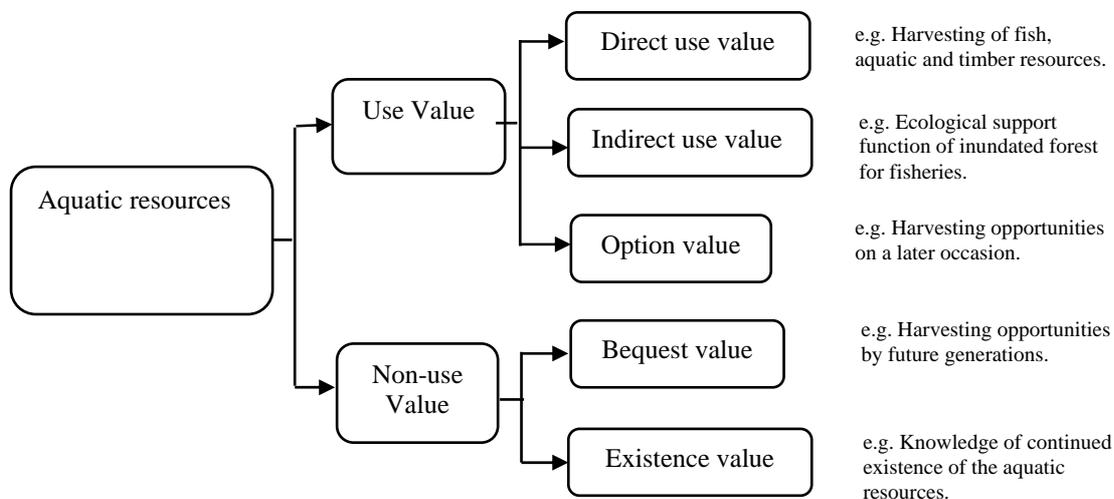
- Valuation methods for fishing activities within a context of water multi-uses and multi-users, with special reference to local rural development and poverty alleviation in the specific context of developing countries.
- Policy research for a better understanding of small-scale fisheries policy process (design and implementation) in the specific context of water multi-uses and weak governance characterizing developing countries.

<sup>7</sup> For illustration, an in-depth assessment of the social and economic values of the inshore and deltaic fishing activities operated by the local populations of the Delta and Bayelsa states in Nigeria is unlikely to have any impact on the actual status quo, unless this information is placed within the wider context of the Nigerian national economic development priorities (and in particular, the oil-revenue issue).

The first of these two research areas will be treated in detail in the next section. The second research area is beyond the scope of the present paper and will not be developed here. It corresponds to the Theme No.3 of the TOR “Policy objective, legal framework, institution and governance” and should be addressed under this last theme.

#### 4.2 Valuation of fishing activities within a multi-use, multi-user context

In general terms, values can be defined as: “beliefs, either individual or social, about what is important in *life and thus about the ends or objectives which should govern or shape public policies*” (Royal Commission on Environmental Pollution, 1998). Based on this definition, economic valuation in fisheries can be approached in a number of different and yet complementary ways. Three broad economic-value study approaches can be identified: (1) conventional economic valuation; (2) economic impact analysis; and (3) socio-economic analysis.



**Fig. 4. Components of the Total Economic Value (TEV) of an aquatic resource, such as a river system and its adjacent wetlands.**

##### 4.2.1 Conventional economic valuation

The conventional approach in economics to environmental valuation is to look for some way of measuring human preferences for or against changes in the state of the environment (improvement or deterioration). Where such preferences are expressed as willingness to pay – for example, to raise water quality on a certain stretch of river – value can be expressed in monetary terms. This can then provide a rational basis for policy decision-making on the use or management of environmental assets.

##### ECONOMIC VALUES AS SOCIAL VALUES

It can also be argued that economic values are social values, since the concept of value is anthropocentric (see definition above): it is the people who value the environment, and accordingly the estimated value resides with the individuals themselves rather than in the objects of their assessment. The arithmetic of conventional economic valuation is underpinned by Economic Efficiency Analysis (EEA) which has the maximization of social welfare (defined in terms of the optimal allocation of resources) as its goal. There are two ways in which EEA is commonly applied. These are cost-effective analysis and cost benefit analysis. With cost-effective analysis there is a presumption in favour of the least-cost option for achieving a given objective; with cost-benefit analysis, the presumption is in favour of the option which produces the highest ratio of monetary benefits to costs. In short, there is an implicit value judgement underlying efficiency analysis (i.e. that improvements in economic efficiency are desirable). In a policy-planning context, this presumption in favour of

efficiency is the basis of a number of decision criteria that can be used to select and prioritize project options (or other interventions) in terms of their economic value to society.

### **TOTAL ECONOMIC VALUE**

It is recognized that a natural resource may provide a range of benefits according to the particular use or function it fulfils, and this forms the basis of the concept of Total Economic Value (TEV). The components of TEV in respect of an aquatic resource, such as a river system and its adjacent floodplains, are shown in Figure 4. The obvious and tangible benefits would be those derived from *direct use* of the resource, and these may materialize in the form of commodities (e.g. fish, aquatic plants, fuel-wood) or services (e.g. recreation and amenity). The aquatic resource may however also have additional indirect use, such as coastal protection and providing a habitat for juvenile fish. These represent the ecological values of the ecosystem. Individuals may also derive a benefit from being able to postpone their personal use of the resource to a later date; they attach an option value to using the resource. There is also another set of benefits, which are quite distinct, termed *non-use* (or “passive” use value). This might include the value associated with the desire to maintain a river fishery intact for future descendents (bequest value) or simply the satisfaction of knowing that a particular aquatic habitat has been preserved in perpetuity (existence value).

### **4.3 Economic impact analysis**

In contrast to the EEA described above, Economic Impact Analysis (EcIA) does not set out to determine whether a particular policy intervention or project is either beneficial or detrimental in terms of economic worth to society. While EcIA will consider the level of benefits generated by an intervention, it does not consider costs of implementation (i.e. there is no benefit-cost framework). Instead, EcIA aims to establish what effects a particular policy intervention or project has on specific variables. This might involve using *revenue analysis* to see whether a new fisheries management system is likely to raise fishermen’s gross earnings or revenue. One direct application of this EcIA approach already mentioned is the evaluation of the revenue losses induced by the SEMRY irrigation schemes on the Yaéré populations (see section 3.3.1).

More ambitiously, EcIA might involve the application of *multiplier analysis* to measure the total economic activity generated by a new fisheries management system as a consequence of the interdependence between fishing and other sectors comprising the regional economy. The total economic impact will be made up of direct and secondary (i.e. indirect and induced) effects both locally and regionally. In the case of fisheries this will include not only the effects on employment and income that an improvement in the management system (or an increase in fish production or fleet size) can induce on direct upstream and downstream sectors such as boats and fishing gear supplies and services, processing, trading and marketing activities, fish transport, but also indirect effects such as the increase in demand for infrastructure and services (e.g. port infrastructures, education and health services, etc) which may follow the economic improvement of the area which benefits from the improved fishing activities.

### **4.4 Socio-economic analysis**

Finally, it is important to reiterate the point made above, that conventional economic valuation is concerned with the analysis of whether particular interventions or projects improve the net wealth of society. It might be the case that this outcome also involves the creation of “winners” and “losers” in society. For example, the building of a dam across a river for hydro-electric power involves a wide diversity of effects including major changes in environmental quality and aquatic resource use. Conventional cost-benefit analysis sidesteps the issue by invoking the principle of “potential compensation” (i.e. that the intervention represents a net gain to society if the winners could compensate the losers and still be better off), but since this principle does not insist that compensation actually be paid it starts to become rather unsatisfactory where the losers also happen to be the poorest of the poor.

In other terms, the arithmetic of economic valuation may well adjudge a project such as dam construction, to be worth undertaking insofar as it improves the net wealth of society, but it is unclear whether the social impact of the project is likely to be neutral or not. In such situations (especially

where there is poor governance within the weak state context) something more than economic valuation is warranted, specifically a *distributional analysis* to examine how the net costs and benefits are apportioned across different groups affected by the change. Socio-economic analyses can often provide an important starting point in identifying and characterizing the socio-economic strata in a community or region. Once the social strata are known, further in-depth economic studies (e.g. income-expenditure surveys) can provide a better understanding of benefit flows (or the lack of them) in relation to specific policy interventions.

#### 4.5 Livelihood analysis

In recent years, socio-economic analysis has been further extended with the development of techniques for Livelihood Analysis (LA). When underpinned by conceptual frameworks, such as the Sustainable Livelihoods Approach (SLA), they can help to provide a better understanding of the relationship between human society and natural resources. In this respect, LA can be used to complement economic valuation and socio-economic analysis.

##### 4.5.1 *The rationale for adopting Livelihood Analysis*

Intrinsically, economic valuation techniques do not permit the identification of the factors which influence or affect people's access to these resources. However, very often the key issue is not the availability of the resource (or conversely its scarcity, to which its economic, or even social value is related), but the access to this resource. Extending Sen's main conclusion<sup>8</sup>, which was initially framed in the specific context of famine (Sen, 1981), to the wider domain of natural resources, an increasing number of empirical studies have clearly demonstrated that poor people in rural areas are usually those who lack access to the natural resources: e.g. forest, fishing grounds, grassland, (e.g. Kremer 1994, Devereux 1996, Leach, Hearn and Sconnes, 1999).

Within the context of fisheries, this issue can be illustrated through the example of the Fisheries Enhancement Programmes (FEP) initiated in the 1990s in Bangladesh. These FEP were carried out with the double objective: of (i) mitigating fish resources over-exploitation; and (ii) poverty reduction for the poorest (landless) households which largely depend on these resources to sustain their livelihoods. For a majority of them, these FEPs have been technically successful and there is little discussion that fish production increases in the enhanced water-bodies (see for instance Welcomme and Bartley, 1998. Ali and Islam, 1998. Cowx, 1999). There is, however, increasing evidence that at the same time these FEPs have partially or even totally failed to improve the food security and welfare of the poorest people (Ahmad *et al.* 1998, Apu and Middendrop 1998). The literature reveals in particular that the poorest, who could not invest in adequate fishing gears and fishing licenses (required to access the newly enhanced water-bodies) were totally excluded or only benefited from a very limited portion of the increased fish production (Bernacsek, 1994. Capistrano, Ahmed and Hossain, 1994). This example is particularly instructive because it clearly illustrates the point emphasized above, i.e. determining the value of a resource may be irrelevant, if people cannot access it.

It can further be argued that adequate policies and processes (e.g. effective management) of natural resources needs information about the people involved, and the ways in which people use natural resources to sustain their livelihoods. In other words, to make an appropriate decision regarding the management of a natural resource, one not only needs the economic value (albeit through the most comprehensive evaluation framework possible, such as the TEV), one also needs to know the contribution which this resource makes to livelihoods: who uses the resources? When? How?

The Sustainable Livelihoods Approach (SLA) offers a useful framework to answer these different questions. In brief, SLA is a holistic and people-centred approach that attempts to capture and provide a means of understanding people's livelihoods, and in particular the factors and processes which affect these livelihoods (DFID 2000a). The framework consists of five components: (1) the vulnerability context of the environment in which the communities under consideration operate; (2) the livelihood

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<sup>8</sup> Sen's main conclusion, based on the empirical observation that people can starve to death in the midst of food, is that it is the people's entitlement to the resource (in this case, food), rather the abundance of this resource, which is the key factor to explain famine.

assets of these communities; (3) the Policies, Institutions and Processes (PIPs) which affect their lives and in particular their access to livelihood assets; (4) the livelihood strategies which the communities adopt; and (5) the outcomes they achieve or which they aspire. An important aspect of the SLA is its use in helping to understand the role of institutions (e.g. rules or norms) which appear to be so important in shaping the mechanisms which affect people's access to the resource.

SLA is therefore a powerful tool which can provide the conceptual basis for:

- the analysis of the causes of vulnerability – shocks and stresses in the economic, social and political context, trends, seasonality, fragility of natural resources, etc. – which affect the communities;
- the assessment of the assets, at the individual, household or community levels, comprising human, social, economic, physical and natural resource assets;
- the description of the context within which livelihoods evolve – policies at both micro- and macro-levels; civil, economic and cultural institutions, both formal and informal; the nature of governance and its processes at all levels in society;
- the identification of people's livelihood strategies, including, but not restricted to, consumption, production and exchange activities; and
- the evaluation of the resulting livelihood outcome, assesses multidimensionally in terms of food and other basic needs security, greater sustainability of the natural resource base, reduced vulnerability and increased income.

In summary the value of such a framework is to encourage analysts to take a broader and systematic view of the factors that affect people's livelihoods – whether these are shocks and adverse trends, poorly functioning institutions and policies, or a lack of assets – and to investigate the relations between them. It does not take a sectoral view, but tries to recognize the contribution made by all the sectors to building up the stocks of assets upon which people draw to sustain their livelihoods. It is important, however, to keep in mind that this SLA is, and remains, a *conceptual* framework. It is not an assessment technique *per se*.

#### **4.5.2 Livelihood analysis in practice**

As mentioned earlier, water is a multi-use/multi-user resource. This characteristic induces a certain number of important methodological constraints. In particular, the intricacy of activities characterizing the livelihood strategies of the large majority of fishing households – cf Fig.2 (c) – implies that mono-sectoral approaches disaggregating and considering these uses as separated activities (e.g. fisheries on one hand, and agriculture on the other) are not appropriate. To evaluate more correctly the exact contribution of these activities and their complementarities more integrated (holistic), assessment analyses are needed where the different sectors of the local economy would be viewed together as a joint production activity.

The survey techniques and methods required for those trans-sectoral socio-economic valuations already exist. They have been tested and applied for many years in other domains (e.g. agro-pastoral, agro-forestry systems) and their respective methodological and analytical strengths and weaknesses are well documented (e.g. DFID 1998). Usually a combination of participatory and non-participatory (passive) techniques is required. Those methods are either qualitative or quantitative in nature, based on verbal or visual, rapid or in-depth interviews/data collection. They can be developed as case studies or relying on larger-scale surveys. They are usually designed and implemented by multidisciplinary teams. There is no one unique 'recipe' or best methodological combination. The only central condition is that they must be trans-sectoral and holistic. Some of them are presented in Table 3 below but the list is not exhaustive.

Finally, to sum up this discussion, the different techniques and approaches which have been briefly described in this section are recalled in Figure 5. Altogether, these different, but complementary approaches constitute an overall framework which can be applied for the valuation to fisheries and aquatic resources within a multi-use/multi-user context.

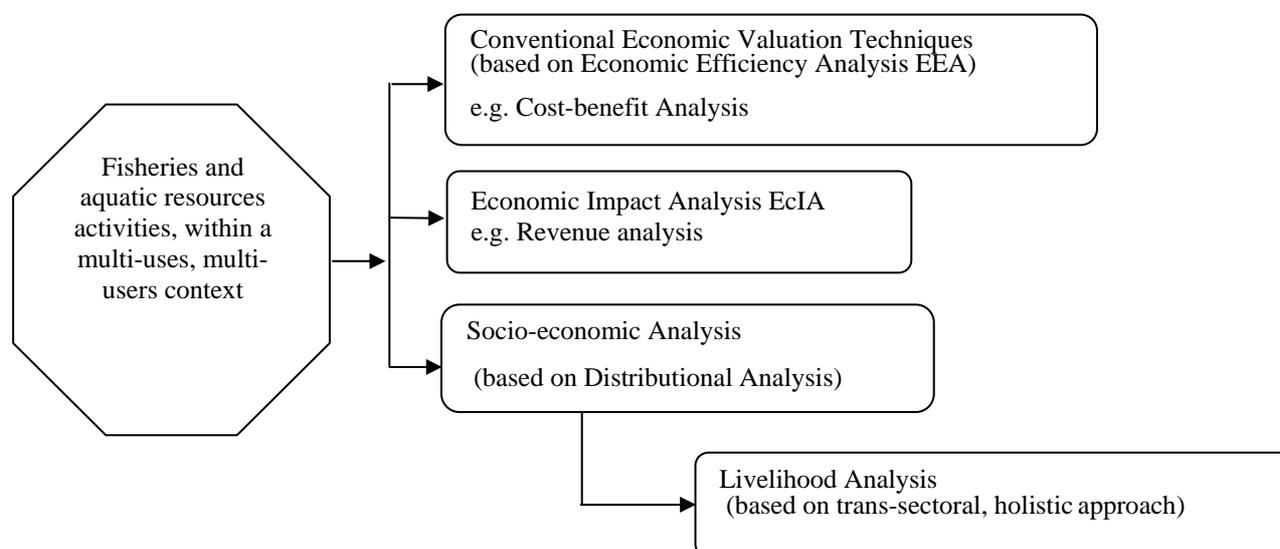
**Table 3. Types of socio-economic techniques susceptible to be used in fishery-livelihood analysis.**

Type of analysis / assessment	Data collection techniques
Wealth ranking	Participatory/Consultative/Passive Verbal/Visual / Analytic Quantitative/Semi-Quantitative/Qualitative Rapid Appraisal/In-depth survey Case study/Large-scale survey
Income-expenditure survey	
Food Security assessment	
Institutional analysis	
Stakeholder analysis	
Conflicts analysis	
Ethnic analysis	
Gender analysis	
Natural Resource accessibility analysis	
Multi-sectoral Activity Analysis	
Household survey	
Activity ranking	
Seasonal Calendar	
Oral histories	

### 5. FISHERIES AS “A LAST RESORT ACTIVITY” FOR THE POOREST

The last section of this paper addresses the particular issue of “fishery as a last resort activity” for the poor. Basically the idea conveyed by this hypothesis is that fisheries, due to their open or semi-open nature, offer an alternative activity to people (individuals, or communities) when other economic activities fail to provide adequate economic support, or when these people are economically or institutionally denied the access to other activities. Through this mechanism, fisheries are assumed to offer “pro-poor” socio-economic support to the most deprived (e.g. the landless).

The objective of the section is not to provide any definite answer to whether or not fishery does fulfil this role of “activity of last resort”, but simply to highlight the complexity of the issue and to offer some preliminary elements of reflection for further investigation. It should also be noted that the question is addressed here mainly from a theoretical/conceptual point of view, although reference to empirical evidence is made in the first part of the section.

**Figure 5. Valuation techniques for aquatic resources within a multi-use context.**

### 5.1 A wide consensus across the literature

The first point to notice is that the “last resort activity” hypothesis has received a large consensus in the fishery literature. Table 4 is a collation of quotes from articles and documents which explicitly report the occurrence of this mechanism in small-scale fisheries. The table illustrates the great extent to which this role has been emphasized, especially in developing countries over the last two decades.

**Table 4. Fisheries as the “last resort for the poorest”\***

Reference (chronological order)	Quotation
Panayotou 1980, p.145	“Open access fisheries (as well as other natural resources of similar status) often serve as safety valves for population pressures and as source of subsistence and cash income for those who by virtue of their poverty have little or no access to other sources of income”
Panayotou 1982, p.30 (see also footnote 32 p.27)	“There is considerable evidence that coastal fishing is an economic activity of last resort. For example Pollnac & Sutinen (1979) report that in East Africa “fishing is viewed as the employment of last resort ... people fish when farming is not feasible”... Yet another example is found in Cordell (1973) who reports that in Northeast Brazil labourers released from coconut plantations took up canoe fishing for lack of better alternatives...”
Bailey & Jentoft, 1990, p.337 and p.341	“The open access nature of fishery resources and the ease with which people can enter a fishery with limited experience or capital investment, means that there are few obstacle to seeking a livelihood at sea.... The role of fisheries as employment source of last resort underscores the importance of employment generation...” “... ocean fisheries function as a society valve for surplus labour ...”
FAO 1994, p.7	“Marine fisheries typically are the employer of last resort. Fishers who do not own the boats on which they work are reported to feel a general sense of hopelessness and despair regarding opportunities for upward mobility”.
Machena & Kwaramba 1997, p.245	“The worsening economic climate in the country is also a strong contributory factor to the crisis. Fishing is often described as an ‘activity of the last resort’. Entry into the gillnet fishery is easy compared to other economic ventures because of the low capital input requirements”.
Townsley 1998, p.142	“Indeed, aquatic resources in many parts of the world constitute a resource of ‘last resort’. Open access fisheries and other forms of aquatic resource use are fall-back options for the rural poor when loss of land or failure in access to other rural activities threaten their livelihoods”.
Paynes 2000, p.1	“[Fishery] is often one of the few livelihoods open to the landness and often becomes the default livelihood”.
FAO 2000, point 5	“Small scale and subsistence fisheries have often been denoted as ‘employers of the last resort’ implying that people enter open access fisheries when they are unable to make a living in other sectors”.

\* *In this table only references are quoted which use explicitly the terms “last resort” or “safety valve”, not those which mention or describe this mechanism but do not use the two key-terms (for those, see for instance van Zalinge, Thuok and Seang Tana (1998) or Degen and Thuok (1998) for the rural populations in Cambodian floodplains after Pol Pot times, Beck and Gosh (2000) for the populations living on the Bank of the river Matla (India), Gutkind (1989) for the Fante (Ghana) and Jul-Larsen (1994 for the Xwala (Benin) for population during the development of the West-African coastal fisheries in the 1950s and 1960s, Dia (1998) for the cephalopod fisheries in Mauritania in the 1990s, etc. (source Béné, 2003)*

## 5.2 A combination of two different mechanisms

A more in-depth analysis, however, highlights that this pro-poor capacity of small-scale fisheries to sustain poor people results in fact from the combination of two distinct mechanisms:

- First, the “redistributive” dimension of fisheries, i.e. the fact that fishing activities often appear to be of greater importance to the poor in terms of income, food security and employment than for the non-poor. Within this approach, fishing is considered as a fundamental “pillar” on which poor families facing chronic (long-term) destitution rely to sustain their livelihoods.
- Second, the “safety-net” capacity of fisheries, the fact that in periods of individual or collective economic crisis, fishing may also provide alternative or additional sources of income, employment and food for the households – poor and less-poor – whose livelihoods have been temporarily reduced or affected by the crisis.

Those two mechanisms (Table 5) are detailed in the following paragraphs.

### 5.2.1 The “redistributive” dimension

The assumption of redistributive capacity is based on the empirical observation that fishing activities usually make up a larger share of the poor people's subsistence and income bases than for the better-off households. This heavier reliance on fisheries activities by the poor can, itself, be explained by the combination of two mechanisms.

(A) A *compensating effect* offered by the semi-open or communal access which usually characterizes fishery resources. In situations of (economically or institutionally) restricted access to other capital (e.g. financial capital, such as credit) or production factors (such as, private land) the supposedly relatively easy/free access to fishing grounds allows the poor to rely more heavily on the local common resources to obtain/extract the goods and services they need to sustain their livelihoods.

Although the compensating effect is observed in a significant number of situations, its occurrence depends on a stringent condition that Leach and Mearns (1991, p.10) termed the “environmental entitlements”, i.e. the “*combined outcome of: (a) the level/quantity of environmental resource bundles that people have command over as a result of their ownership, their own production, or their membership of a particular social or economic group; and (b) their ability to make effective use of those resource bundles*”. Evidence suggests that the fulfilment of these two conditions is far from being systematic for the poorest part of rural communities – as will be emphasised below – and some scholars even argue that the effective occurrence of the environmental entitlement hypothesis for the poor is in fact an exception rather than the general rule (e.g. Devereux 1996).

(B) An *income share effect*: Other things being equal, the relatively lower total incomes of the poor makes it mathematically easier for fishery-related activities to represent a greater share of their total earnings<sup>9</sup>. It is therefore unsurprising that for a majority of rural poor families, fishing-related activities do represent a large part of their incomes.

Combined, these two mechanisms (the compensating effect and the high share in poor households' income) explain why rural poor may appear to depend more heavily on fishery-derived activities than better-off households. Based on this, the fishery sector is therefore very often perceived and presented as a fundamental element of rural economy upon which poor people facing chronic (long-term) destitution can rely to sustain their livelihood. For several decades, a large number of national governments or bi-lateral or international donor agency poverty-reduction programmes have been based on this perception (e.g. DFID 2000b). It should (or could) then be raised the question: to what extent the relative failure of some of these programmes is related to this initial hypothesis?

<sup>9</sup> For illustration, let us assume two households (a poor and a non-poor) who derive the same amount (e.g. US\$2 per day) from fishing activities. If the daily total income of the first household is US\$4 p.d. while the revenue of the second is US\$10 p.d., this means that fishing corresponds respectively to 50 and 20 per cent of the households' total daily revenues.

### 5.2.2 *The safety-net dimension*

The second element that contributes to this perception of “fishery as a last resort employer for the poorest” is that fishery also appears to play a fundamental role as a “safety-net” element for people in case of contingency. This is the replacement effect. When rural or urban household-head loses his/her wage-based job, when farm crops fail, or when the entire local – or even national – economy collapses, the fishery sector very often represents additional or alternative sources of income, food and/or employment which can help the household to reduce the impact of the crisis. For instance Machena and Kwaramba (1997) reported how the fishery of the Lake Kariba played this role of safety-net during the mid-1990s.

*“... The worsening economic climate in the country is also a strong contributory factor to [this]... People who are threatened by poverty easily find their way into fishing. Economic development opportunities in the areas around Lake Kariba are limited. People are basically agrarian despite the fact that agriculture frequently fails because of a hot and dry climate. During particularly dry years, the situation gets desperate, driving people into the fisheries. ... Fishing is often described as an ‘activity of the last resort’. Entry into the gillnet fishery is easy compared to other economic ventures because of the low capital input requirements” (p.245-46)*

Civil or military wars, population displacements or natural disasters are also events which may drive entire populations to (re)turn to common property resources (and in particular fisheries) to palliate the loss of their regular source of livelihoods.

Table 5 summarizes the different points highlighted in the analysis. It shows how the two mechanisms which the hypothesis of fishery as a last resort activity relies on, act upon diverse dimensions of poverty – the redistributive dimension acting as a positive counterbalance against chronic (long-term) poverty while the safety-net capacity is used by the poor as a ‘cushion’ against short-term vulnerability.

**Table 5: Mechanisms contributing towards the perception of fishery as a critical livelihood support (activity of last resort) for poor and / or vulnerable households.**

<b>Criteria</b>	<b>(i) Effects</b>	<b>(ii) Assumption</b>	<b>(iii) Poverty reduction effect / contribution to livelihood</b>	<b>(iv) Poverty dimension / beneficiaries</b>
<b>Pro-poor mechanisms</b>				
<i>Redistributive</i> dimension of fisheries: the contribution of fishery for poor livelihoods appears higher than for non-poor.	<p><i>Compensating effect:</i> while denied access to other capitals and production factors, the poor rely more heavily on fishery-related activities to sustain their livelihoods.</p> <p><i>Income share effect</i> *: the lower total income of the poor makes it easier for fishery-derived revenues to make up a high share of the total income.</p>	<p><i>Environmental entitlements</i> of the poor i.e.</p> <ul style="list-style-type: none"> <li>· availability of the resource bundles that people have command over (as a result of their ownership, their own production, or their membership of a particular social or economic group).</li> <li>· ability of these households to make effective use of those resource bundles.</li> </ul> <p>No assumption</p>	<p>Fisheries providing</p> <p>Subsistence products and material (food, water, fodder, etc.).</p> <p>Income (through employment, self-employment, trade/commerce activities).</p>	<p><i>Ex-ante strategy against long-term (chronic) poverty</i></p> <p>Usually households unable to maintain a minimum living standard with the resource at their disposal.</p>
Safety-net capacity of fisheries: fishery provides alternative and/or additional source of support in case of crisis.	<p><i>Replacement effect:</i> In situation of temporary crisis (collapse or cutback of the regular livelihood support), fisheries can provide activities and materials to replace or complement the deficient support. **</p>	<p><i>Environmental entitlements</i> of the vulnerable households: points (a) and (b) as above.</p>	<p>Fisheries providing</p> <p>Mainly subsistence products and material (food, water, fodder, etc.).</p> <p>Possibly complementary income (through temporary self-employed activity, petty trading).</p>	<p><i>Ex-post reaction against transient poverty / Short-term vulnerability</i></p> <p>Vulnerable households may or may not be above the “poverty line” initially but face risks to their livelihoods which could drop them below the line.</p>

Notes: \* The income share effect does not effectively participate as such to poverty reduction. It actively contributes to the perceived “redistributive” dimension of fisheries –see text for details.

\*\* If the fishing sector becomes a permanent source of subsistence products or income, the safety net role has been transformed into a chronic redistributive mechanism.

The table also shows that these two mechanisms are based on distinguishable effects which operate under different circumstances and affect different types of households. These effects may, however, complement and reinforce each other, generating this overall and confusing impression of pro-poor activity. Underpinning this perception is the assumption of “environmental entitlement”, namely that fisheries are easily accessed by the poor.

### 5.3 A need for further research

Although this mechanism of activity of last resort may occur in a large number of circumstances in both inland and marine fisheries (as suggested by the list in Table 4), an increasing number of empirical studies question this assumption and emphasize that fishing can also, in other circumstances, be a powerful means of wealth differentiation and further marginalization of the poor. In the Chari Delta in Chad for instance, a recent fishery livelihood analysis showed that fishing contributes the largest proportion of income to the richest households and remains relatively inaccessible to the poorest. Those poorest households who lack fishing gears and have access only to marginal and low-productive water-bodies, must find alternative activities as their main source of income, and in this case, the study reveals that the households mainly rely on woodcutting. In these areas, it seems therefore that woodcutting plays the role of last resort for the poorest, while in contrast fishing activities are a key-element of the livelihoods of the richest households (Béné *et al.* 2003b).

This situation where the poorest seem to be excluded from the fisheries has been already described in other parts of Africa. In the Nguru-Gashua wetland in North Nigeria, Neiland *et al.* (1997, p.300) observed for instance that “*the richest fishers are those with ownership and access rights, whereas the poorest fishers are marginalized or excluded entirely from the most productive fisheries*”. In Bangladesh, which is a typical example of developing country where fisheries are usually presented as a fundamental safety valve sector for the poorest and landless, Kremer (1994) found that in some areas it was the poorest people who were denied access to the floodplain areas supporting the most productive fisheries. He concluded:

*“Access to the fishery is effectively an asset. Being both scarce and unequally distributed it confers economic benefits upon fishermen, but to some more than others. ... In brief one should reconsider the popular romantic view that the floodplain is “an open access resource, open to anyone with a net” (Majumder and Durante 1993, p.1) and therefore a resource of last resort for the poorest of the poor. The most productive parts of the floodplain are gradually being privatized and territorial control over the rest has been established according to a community’s relative power” (Kremer 1994, p.9).*

In summary, it seems that the question of whether or not fisheries do act as an “activity of last resort” for the poorest may not be clear-cut and deserves further investigation. From the analysis above, it also appears that both theoretical (conceptual) and empirical works are required in this domain if we wish to address this issue in a more comprehensive way, and provide relevant policy recommendations for poverty alleviation in fisheries. At the present time, too much confusion between the different elements that contribute to this mechanism prevents a correct evaluation. The design of an analytical framework is first required that should help decompose and analyse the different mechanisms at work and their potential roles in poverty alleviation. Once it is conceptualized, this framework could then be applied to empirical case-studies through a large-scale research programme. The following list of questions provides some preliminary guideline for further research:

- Small-scale fisheries and poverty-reduction
  - Do small-scale fisheries have a real poverty reduction capacity? In other terms, do fisheries have an intra-sectoral capacity to reduce poverty?
  - If so, under which conditions? For whom?
  - How can this poverty-alleviation capacity be promoted without affecting the financial accumulation capacity of the sector (necessary for rural development). In other terms, is there a trade-off to be found between economic growth and redistribution within the fishery sector?

- Poverty reduction mechanisms
  - What are the exact roles and respective importance of the different mechanisms identified in Table 5 (redistributive effects, safety net effect)?
  - Under which socio-institutional conditions do these different mechanisms operate effectively?
  - Are all those mechanisms equally desirable?
- Policy implications
  - Should the role of "activity of last resort" of the artisanal fisheries be supported?
  - If so, by which policies?
  - Is there an opposition between poverty reduction (through the "activity of last resort" ability of fisheries) and natural resource conservation?
  - If not, can those two agendas be satisfied simultaneously in the short-run in order to satisfy the Millennium Development Goals?<sup>10</sup>

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<sup>10</sup> The Goal No.1 of the Millennium Development document (voted by the General Assembly of the United Nations in 2000) is "Poverty and hunger eradication" through Target No.1 = reduce by half the number of people living below the poverty line of USD1 per day, and Target No.2 = reduce by half the number of people suffering from hunger by 2015. The Goal No.7 and in particular its target No.9 is to integrate the principle of sustainable development in country policies and reverse the loss of environmental resources.

## REFERENCES

- Adams, T. 1998. The interface between traditional and modern methods of fishery management in the Pacific Islands. *Ocean and Coastal Management* 40, 127-142.
- Adams, W. 1993. Indigenous use of wetlands and sustainable development in West Africa. *The Geographical Journal* 2, 209-218.
- Ahmad, I., Bland, S., Price, C. & Kershaw, R. (1998). Open water stocking in Bangladesh: experiences from the third fisheries project. In Petr T. (Ed.), *Inland fishery enhancements*. FAO Fisheries Technical Paper 374, (pp.337-350). Rome: Food and Agriculture Organization and UK Department for International Development.
- Ahmed, M., Navy H., Vuthy L., & Tiongco M. (1998). Socio-economic assessment of freshwater capture fisheries in Cambodia. Department of Fisheries, DANIDA, And MRC, Phnom Penh, Cambodia, Mekong River Commission, 185.
- Ali, L. & Islam, M. (1998). An assessment of the economic benefit from stocking seasonal floodplains in Bangladesh. In Petr T. (Ed.), *Inland fishery enhancements*. FAO Fisheries Technical Paper 374, (pp.289-308). Rome: Food and Agriculture Organization and UK Department for International Development.
- Anon. (2001). Report of the Seminar “contribution of fisheries to poverty reduction in West Africa” 14-15 February 2001, Dakar.
- Apu, N. & Middendorp, H. (1998) Establishing fishers groups for self-management of enhanced fisheries in semi-closed waterbodies in Western Bangladesh (the experience of the Oxbow Lakes small scale fishermen project). In Petr T. (Ed.), *Inland fishery enhancements*. FAO Fisheries Technical Paper 374, (pp.393-406). Rome: Food and Agriculture Organization and UK Department for International Development.
- Bailey, C. & Jentoft, S. (1990) Hard choices in fisheries development. *Marine Policy* July, 333-344.
- Barr, J. (2000) Livelihood strategies and resource use in Bangladesh floodplain –opportunities for benefiting the poor where competing uses of resources occur. Invited presentation at DFID workshop: Improving the poverty focus of NRSP’s research on management of natural resources. International Centre for Agricultural Research, Rothamsted, 29-30 November 2000.
- Beck, T. & Ghost, M. (2000) Common property resources and the poor. Findings from West Bengal. *Economic and Political Weekly* 35(3), 147-153.
- Béné, C. (2003) When fishery rhymes with poverty, a first step beyond the old paradigm on poverty in small-scale fisheries. *World Development* 31(6) forthcoming.
- Béné, C., Mindjimba, K., Belal, E., Jolley, T. & A. Neiland (2003A) Inland fisheries, tenure systems and livelihood diversification in Africa: the case of the Yaéré floodplains in Cameroon. *African Studies* 62(2) forthcoming.
- Béné, C., Neiland, A., Jolley, T., Ovie S., Sule O., Ladu B., Mindjimba K., Belal E., Tiotsop F., Baba M., Dara L., Zakara A., & Quensière J. 2003b. Inland fisheries, poverty and rural livelihoods in the Lake Chad Basin. *Journal of Asian and African Studies* 38(1) forthcoming (also available in Neiland and Béné (2002), pp.153-187).
- Bennett, E., Neiland, A., Anang, E., Bannerman, P., Rahman, A., Huq, S., Bhuiya, S., Day, M., Fulford-Gardiner, M. & Clerveaux, W. 2001. Towards a better understanding of conflict management in tropical fisheries: evidence from Ghana, Bangladesh and the Caribbean. *Marine Policy* 25, 365-376.
- Bernacsek, G.M. 1994. Socioeconomic constraints impeding implementation of the new fisheries management policy in Bangladesh. *Socio-economic Issues in Coastal Fisheries Management, Proceedings of the IPFC Symposium held in conjunction with the 24th Session of IPFC*. (pp.248-258). INDO-Pacific Fisheries Commission. Bangkok, Thailand 23-26 November 1993.
- Blench, R. 1996. Aspects of resource conflict in semi-arid Africa. *Natural Resources Perspectives* 15, London, Overseas Development Institute.
- Capistrano, A, Ahmed, M., & Hossain, M. 1994. Ecological, economic and common property issues in Bangladesh's open water and floodplain fisheries. *Third Biennial Meeting of the International Society for Ecological Economics*. San Jose, Costa Rica, 24-28 October 1994.

- Chaboud, C., & Dème M. 1989. Ressources instables et pêche semi-industrielle: les exemples sénégalais et ivoirien. In Cury P. and Roy C. (editors) *Pêcheries ouest-africaines ; variabilité, instabilité, et changement*. Paris, ORSTOM, 489-503.
- Charles, A. 1992. Fishery conflicts, a unified framework. *Marine Policy* Septembre, 379-393.
- Chauveau, J.-P., Jul-Larsen, E. & Chaboud, C. (editors). 2000. *Les pêches piroguières en Afrique de l'Ouest; pouvoirs, mobilités, marchés*. Paris: Editions Karthala, IRD, CMI.
- CGIAR. 2002. The Challenge Programme on Water and Food. Available at <http://www.cgiar.org/>
- Cowx, I. 1999. An appraisal of stocking strategies in the light of developing country constraints. *Fisheries Management and Ecology* 6, 21-34.
- Cowx, I. 2003. Value of fisheries river. Proceedings of the Second International Large River Symposium. Mekong River Commission and Food and Agriculture Organization, 11-14 February 2003, Phnom Penh Cambodia.
- Degen, P. & Thuok, N. 1998. Inland fishery management in Cambodia: is the fishing lot system the basis for improved management or should it be abolished? *Crossing boundaries, 7th annual conference of the International Association for the Study of Common Property*. IASCP. Vancouver.
- Devereux, S. 1996. *Fuzzy Entitlements and common property resources: struggles over rights to communal land in Namibia*. IDS Working paper 44, Brighton: Institute of Development Studies, University of Sussex.
- DFID. 1998. Socio-economic methodologies. Best practice guidelines. Department for International Development London, published by the Natural Resources Institute.
- DFID. 2000a. Sustainable Livelihoods Guidance Sheets, available at [www.livelihoods.org](http://www.livelihoods.org)
- DFID. 2000b. Pathways out of poverty: people-centred solutions from fisheries research. Department for International development, Rural Livelihood department Renewable Natural Resources Research Strategy, London, available at :[www.dfid.gov.uk](http://www.dfid.gov.uk).
- DFID. 2001. People, Fisheries and Aquatic Resources of the Mekong A Research Programme Development Workshop, DFID-STREAM, 12-14 December 2001 Phnom Penh.
- Dia, M.C. 1998. Mauritanie, volet socio-anthropologie. *Etude comparative des systèmes de gestion et de marchés dans les pêches céphalopodières d'Afrique de l'Ouest*. Projet de recherche DGXII-MUYS .
- European Commission. 2000. Communication from the Commission to the Council and the European Parliament. Fisheries and Poverty Reduction. COM(2000) 724 final. Commission of the European Communities, Brussels, 20 p.
- Evans, P. 2003. Community fisheries development on the Tonle Sap Great Lake. Proceedings of the Second International Symposium on the management of large rivers for fisheries. Mekong River Commission, Phnom Penh 11-14 February.
- FAO. 1984. World Conference on fisheries management and development. Food and Agriculture Organization, Rome 27 June - 6 July.
- FAO. 1994. Socio-economic Issues in Coastal Fisheries Management. Proceedings of the IPFC Symposium, Bangkok, Thailand 23-26 November 1993: Food and Agriculture Organization.
- FAO. 2000. Poverty in coastal fishing communities. Advisory Committee on Fishery Research Third Session 5-8 December 2000. Rome: Food and Agriculture Organization. <http://www.fao.org/DOCREP/MEETING/003X8905E.html>.
- FAO. 2003. Number of fishers doubled since 1970, Food and Agricultural Organization, Fisheries Department, available at <http://www.fao.org/fi/highligh/fisher/c929.asp>
- Fay, C. 1994. Organisation sociale et culturelle de la production de pêche: morphologie et grandes mutations. In Quensière J. (editor) *La pêche dans le Delta Central du Niger*. Paris: ORSTOM, 191-207.
- Foucat, A. 2002. Community-based ecotourism management moving toward sustainability, in Ventanilla, Oaxaca, Mexico. *Ocean and Coastal Management* 45, 511-529.
- Gutkind, P.C. 1989. The Canoemen of the Gold Coast. *Cahiers d'Etudes Africaines* 29, 339-376.
- Harrtmann, W. 1989. Conflictos de pesca em agua interiores da Amazonia e tentativas para sua solucao. In Pesca Artesanal: tradição e modernidade. Encontro de Ciencias Sociais e o Mar. Progamma de pesquisa e conservação de areas umidas no Brasil, Sao Paulo, 103-118.

- Hart, P.J.B. & Pitcher, T.J. 1998. Conflict, consent and cooperation: an evolutionary perspective on individual human behaviour in fisheries management. In: *Reinventing Fisheries Management* (eds. T.J. Pitcher, P.J.B. Hart and D. Pauly). Chapman & Hall, London, pp. 215-225.
- Hoggarth, D. D., Cowan, V. J., Halls, A. S., Aeron-Thomas, M., McGregor, J. A., Garaway, C. A., Payne, A.I. & Welcome, R. L. 1999. Management guidelines for Asian floodplain river fisheries: 384, Rome: FAO, DFID, and MRAG.
- Horemans, B.W., & Jallow, A.M., (editors). 1997. Report of the Workshop on Gender Roles and Issues in Artisanal Fisheries in West Africa, Lomé, Togo, 11 – 13 December 1996. Cotonou, Benin, Programme for the Integrated Development of Artisanal Fisheries in West Africa. 47p., IDAF/WP/97.
- Jul-Larsen, E. 1994. *Migrant fishermen in Congo; tradition and modernity*. Bergen: Chr. Michelsen Institute.
- Kaczynski, V.M. & Looney, S. W. 2000. Coastal Resources as an engine of economic Growth and reduction of poverty in West Africa: Policy considerations. *Coastal Management* 28, 235-248.
- Kassibo, B. 2000. Pêche continentale et migration: contrôle politique et contrôle social des migrations de pêche dans le Delta central du Niger (Mali). In Chauveau J.-P., Jul-Larsen E. & Chaboud C. Eds., *Les pêches piroguières en Afrique de L'Ouest: pouvoirs, mobilités, marchés*. (pp.231-246). Paris: Editions Karthal, IRD, CMI.
- Kremer, A. 1994. Equity in the fishery: a floodplain in N.E. Bangladesh. R94E, Bath, UK: Centre for Development Studies, University of Bath.
- Lawson, R. 1977. New direction in developing small-scale fisheries. *Marine Policy* 1(1), 45-51.
- Lawson, R. & Robinson, M. 1983. Artisanal fisheries in West Africa; problems of management implementation. *Marine Policy* (October), 279-290.
- Leach, M., & Mearns, R. 1991. Poverty and environment in developing countries: an overview study. Report to ESRC, global Environment Change Programme and Overseas Development Administration, ESRC Swindon.
- Leach, M., Mearns, R. & Sconnes, I. 1999. Environmental entitlements: dynamics and institutions in community-based natural resource management. *World Development* 27(2), 225-247.
- Machena, C. and Kwaramba, R. 1997. The creation of property rights to promote sustainable development in the Lake Kariba inshore fishery in Zimbabwe. In Remane K. (ed.), *African inland fisheries, aquaculture and the environment*. (pp.245-254) Fishing News Books.
- MRAG. 2001. The sustainable Livelihoods approach and capture fisheries: a strategic review of the Fisheries Management Science Programme. London: MRAG.
- Monod, T. 1928. L'industrie des Pêches au Cameroun (Première partie: généralités). Paris: Société d'éditions géographiques maritimes et coloniales (SEGMC).
- Neiland, A. (editor). 2003. Valuation of tropical river fisheries: A Global Review including Asia, Southern Africa, West and Central Africa, and Latin America. Report for the World Fish Center, Penang, Malaysia.
- Neiland, A., Sarch, M.-T., Madakan, J., Ladu, B. M., Jaffry, S. & Cunningham, S. 1994. A socio-economic analysis of artisanal fisheries in N.E. Nigeria. CEMARE Report No.26, DFID Research Project R5471, Portsmouth: CEMARE, University of Portsmouth.
- Neiland, A.E., Jaffry S., & Kudaisi K. 1997. Fishing income, poverty and fisheries management in North-East Nigeria. In Neiland A. (editor). Traditional management of artisanal fisheries in North East Nigeria CEMARE report No. R43 Final Report DFID Research project R5471 University of Portsmouth, 291-319.
- Neiland, A. & C. Béné (eds.). 2002 Sustainable Development of African Continental Fisheries: A Regional Study of Policy Options and Policy Formation Mechanisms for the Lake Chad Basin. University of Portsmouth and European Commission, EU-INCO Project. Final Report, 286 p.
- Neiland, A. & Béné C. 2003. Review of River Fisheries Valuation in West and Central Africa. Background paper commissioned by the World Fish Center for the Water, Ecosystems and Fisheries Review Workshop, Phnom Penh, 15-17 February 2003, 27p.
- Nguinguiri, J.C. 2000. La pêche des migrants: un modèle de croissance pour la pêche locale? A propos du dualisme des théories du développement. In Chauveau J.-P., Jul-Larsen E. and Chaboud C. (editors) *Les pêches piroguières en Afrique de L'Ouest: pouvoirs, mobilités, marchés*. Paris: Editions Karthala and Institut de Recherche et de Développement, 281-297.

- Nguyen Koa, S., Lorenzen K., Garaway C., & Chamsingh B. 2003. Impact of irrigation development on capture fisheries in the rice-based farming systems of Southern Laos. Proceedings of the Second International Large River Symposium. Mekong River Commission and Food and Agriculture Organization, 11-14 February 2003, Phnom Penh Cambodia.
- Nickum, J. & Easter K. 1990. Institutional arrangements for managing water conflicts in lake basins. *Natural Resources Forum*, 14(3), 210-221.
- Panayotou, T. 1980. Economic conditions and prospects of small-scale fishermen in Thailand. *Marine Policy* 4(2), 142-146.
- Panayotou, T. 1982. Management concept for small-scale fisheries: economic and social aspects. FAO Fish. Tech. Pap. 228, Rome: Food and Agricultural Organization.
- Panayotou, T. (editor). 1985. *Small-scale fisheries in Asia, Socio-economic analysis and policy*. Ottawa: International Development Research Center.
- Payne, I. 2000. The changing role of fisheries in development policy. *Natural Resource Perspectives No.59*: Department for International Development, London.
- Ruddle, K. 1993. External forces and change in traditional community-based fishery management systems in the Asia-Pacific Region. *Maritime Anthropological Studies* 6(1-2), 1-37.
- Sana, B. 2000. Systèmes d'aménagement traditionnels des pêches et leur impact dans le cadre de la lutte contre la pauvreté sur les petites pêcheries lacustres du sud-ouest du Burkina Faso. In Report of the Seminar on livelihoods and inland fisheries management in the Sahelian zone, Ouagadougou, Burkina Faso, 03-05 July 2000, 115-128.
- Sen, A. 1981. *Poverty and famines: an essay on entitlement and deprivation*. Oxford: Clarendon Press.
- Smith, I. 1979. A research framework for traditional fisheries. 2, ICLARM Studies and Reviews, Manila: International Center for Living Aquatic Resources Management.
- Thomas, D. & Adams, W. (1999) Adapting to dams: agrarian change downstream of the Tiga dam, Northern Nigeria. *World Development* 27(6):919-935.
- Thompson, P.M. & Hossain, M. 1998. Social and distributional issues in open water fisheries management in Bangladesh. In Petr T. (Ed.), *Inland fishery enhancements*. FAO Fisheries Technical Paper 374, (pp.351-370) Food and Agriculture Organization and UK Department for International Development.
- Toufique, K.A. 1997. Some observations on power and property rights in the inland fisheries of Bangladesh. *World Development* 25(3), 457-467.
- Townsley, P. 1998. Aquatic resources and sustainable rural livelihoods. In Carney D. (Ed.), *Sustainable rural livelihoods: what contribution can we make?* London: Department for International Development, 139-153.
- van Zalinge, N., Thuok, N., & Seang Tana, T. 1998. Where there is water, there is fish? fisheries issues in the Lower Mekong Basin from a Cambodian perspective. *Crossing boundaries, 7th annual conference of the International Association for the Study of Common Property*. IASCP. Vancouver.
- WCD. 2000. Dams and development; a new framework for decision-making. Report of the World Commission on Dams, available at <http://www.dams.org/>
- Welcome, R.L. & Bartley, D.M. 1998. Current approaches to the enhancement of fisheries. *Fisheries Management and Ecology* 5, 351-382.
- Williams, S. & Awoyomi, B. 1998. Fish as a prime-mover of economic life of women in a fishing community. Proceedings of the IIFET Conference, Tromso Norway, 8-11 July 1998.
- World Bank. 1993. Small-scale fisheries: research needs. WB Technical Paper 152, Fisheries Series, Washington DC: World Bank.

### 3. SMALL-SCALE FISHERIES: PAST EXPERIENCE AND FUTURE SOLUTIONS

Dr R. Mahon and D. Wilson

#### SUMMARY

Small-scale management regimes are nearly as unique as small-scale fisheries, although certainly some general lessons about their design can be garnered. In order to describe the development and current condition of small-scale management regimes we chose to begin with descriptions of the small-scale management regimes in place in three geographic locations, the Bay of Fundy, the inland fisheries of Zambia, and the member countries of the Caribbean Community Secretariat (CARICOM). These descriptions begin by outlining the existing fisheries management agencies in each of the cases, and then management measures, stakeholder participation, conflict resolution, resource allocation, monitoring issues are all addressed. The case studies give details about these three unique situations that are then used as examples in the broader discussion that follows.

Drawing on these examples and others, the report addresses several important topics about the design of small-scale fisheries management regimes in general. These include: i) building effective fisheries co-management institutions; ii) ecosystem management; iii) problems associated with small stocks; iv) low perceived value of small-scale fisheries; v) inappropriately structured, planned and operated fisheries departments for small-scale fisheries.

#### **Issue 1: Building effective fisheries co-management institutions**

Considerable recent research has focussed on what does and does not contribute to strong co-management institutions. The first lesson, perhaps, is that co-management must involve real cooperation. Where co-management is simply a recruiting tool for inexpensive labour to help the government to enforce its fisheries regulations it is unlikely to succeed. Even if the co-management institutions are maintained, they will not make the contribution to effective management that truly collaborative approaches can make. The second lesson is that co-management institutions that are based on the democratic representation of the fishers have more depth and staying power than those that are not.

The problem that governments face when they seek to manage small-scale fisheries is accountability. How can the government know and influence the kinds of decisions and behaviours that are going on at the local level so that they can insure that they reflect the government's priorities, e.g., the sustainable and equitable use of a large-scale resource. Fishing communities, meanwhile, want to access the governments' higher-scale reach and resources. Two reasons why communities want to involve the government in local fisheries management are common. The first is simply a desire for the money and other resources that co-management programmes frequently make available. In such cases, the community will remain motivated to participate in co-management so long as the money is flowing. The second reason is that the community is facing a conflict situation and wants the government to help them deal with it. Effective co-management will come about when the government can use its authority to contain and channel fisheries conflicts in creative ways. The benefits of co-management are best achieved when the state is willing to surrender real decision-making power, including the legitimacy that only the government can bestow to democratic local institutions, even while holding them accountable for their responses to the needs of the broader society. Such accountability itself can, in fact, increase the effectiveness of co-management institutions when it takes the form of ongoing, outside participation in goal clarification and the evaluation of achievements.

#### **Issue 2: Ecosystem management**

Ecosystem management has emerged in several forms in discussions of fisheries management. Approaching fisheries management from an ecosystem perspective is biologically attractive because of its recognition of the reality that fishing is related to a far broader set of problems than simply the impact of harvesting on populations. It is also enormously challenging. Most scientific approaches to

ecosystem management, however, use multi-species models that essentially treat ecosystem management as single species management. This leads to overwhelming measurement and analysis problems. From a social perspective, ecosystem management would also result in an exponential increase in the number of groups that would have a stake in any given decision. In fact, the complexity that the management of the marine ecosystem would entail would likely overwhelm any current management institution. The bottom line from these scientific, social and bureaucratic considerations is that ecosystems are not a unit of management that is congruent with democratic, science-driven management as it is carried out on large scales through government bureaucracies. What cannot be done on large scales, however, may be feasible on small scales. Ecosystem management requires the processing of too much biological and social information for which large bureaucracies to handle are required. The ability of institutions on smaller scales to make use of more and more nuanced information suggests that small-scale fisheries are where experiments with real ecosystem management need to begin.

**Issue 3: High Diversity of small stocks of low total individual value that does not justify a full conventional stock assessment, target setting and enforcement programme**

Although small-scale fisheries are often treated as a discrete category, there is in fact a continuum of fishery types from very small subsistence to enormous industrial types. There may be some value in developing ideas relating to this continuum further as a basis for considering problems of small-scale fisheries. For example, are the types of problems often flagged as relating to small-scale fisheries due to the scale of the fishery, the size/value of the fish stock being exploited or the type of management regime that is often found in situations where small-scale fisheries are prevalent? Taking the above three dimensions may provide a useful framework for considering small-scale fisheries issues. Issues relating to these dimensions and their implications for management are discussed. Inventory of the relative distribution of stocks in this framework would provide the context for a research programme on small-scale fisheries that focusses on the relevant characteristics. For small size/value stocks there is the need to develop approaches that are indicator-based rather than conventional stock assessment, use reference directions rather than targets, and emphasize consensual processes.

**Issue 4: Low perceived importance of fisheries in general and small-scale fisheries in particular**

In CARICOM countries, with the exception of shrimp fisheries in Guyana and Suriname, and the lobster and conch fisheries in Belize, fisheries are generally perceived to be of low importance relative to other productive sectors. One reason suggested is that Fisheries Divisions are usually situated in ministries that are primarily concerned with agriculture. The backgrounds of the Chief Technical Officer, Permanent Secretary and Minister are usually agriculture related. Furthermore, because fisheries are mainly small-scale and often rural, fishers are usually from the lowest economic strata and have little voice, except when there are crises. By and large, small-scale fishing is perceived by planners and decision-makers as a subsector that takes care of itself. Proper economic evaluation of the value of small-scale fisheries in national economies would go some way towards redressing this situation. In countries with tourism, this must include the value-added by providing inputs to tourism. Often these are counted under tourism earnings. However, knowing the value although necessary, this is not sufficient. There is the need to communicate this to decision-makers and the public at large.

**Issue 5: Small poorly managed, unplanned fisheries departments that do not have the range of expertise needed to conduct conventional top down management using assessment-based targets**

Problems relating to the actual organization and operation of fisheries departments in countries where small-scale fisheries are predominant may be one of the major reasons for the poor management of these fisheries. In summary, the structure and function of developing country fishery departments, based on levels of financial support that are appropriate to the value of resources to be managed, have not been systematically addressed. Similarly, although the need for improved planning and review processes is frequently identified, there is little to guide managers in these areas. Consequently, systematic action to address these issues has been minimal. This is an area within which there is great potential for input from the field of organizational change management and public administration. In addition to exploring the most appropriate model for fisheries departments of various sizes and with a

mandate for various levels of resource value, there is the need to consider the relative capacity that should be established in national and regional institutions. The matter of how fisheries departments are run and of accountability bears further exploration. When there is no plan that sets priorities for a period and is reviewed on a regular basis, there is scope for a great deal of ad hoc activity on the part of fisheries department staff. In summary, the structure and function of developing country fishery departments based on levels of financial support that are appropriate to the value of resources to be managed have not been systematically addressed. Similarly, although the need for improved planning and review processes is frequently identified, there is little to guide managers in these areas. Consequently, systematic action to address these issues has been minimal.

## **1. INTRODUCTION**

Small-scale management regimes are nearly as unique as small-scale fisheries, although certainly some general lessons about their design can be garnered. In order to describe the development and current condition of small-scale management regimes we chose to begin with descriptions of the small-scale management regimes in place in three geographic locations, the Bay of Fundy, the inland fisheries of Zambia, and the member countries of CARICOM. These descriptions address the specific descriptive elements called for in the Terms of Reference (ToR). Then, drawing on these examples and others, we address several important topics about the design of small-scale fisheries management regimes in general. These include: i) building effective fisheries co-management institutions; ii) ecosystem management; iii) problems associated with small stocks; iv) low perceived value of small-scale fisheries; v) inappropriately structured, planned and operated fisheries departments for small-scale fisheries.

## **2. SMALL-SCALE FISHERIES MANAGEMENT REGIMES IN THREE AREAS**

### **2.1 Small-scale fisheries in the Canadian maritimes: the case of the Bay of Fundy groundfish**

#### ***2.1.1 Agencies and local institutions***

The Canadian Department of Fisheries and Oceans (DFO) has overall responsibility for the system and directly manages an ITQ system for the larger-scale (65 m+) mobile gear fishery. Harvest decisions are made by the Fish Resource Advisory Council (FRAC) while the DFO Science Branch provides analyses of stock status. The small-scale fishery, which consists of < 65 m fixed gear is managed by community management boards that are assigned quotas. The mobile gear boats, all of which are otter trawls, target cod, haddock, pollock and flounder. The fixed gear fleet consists of handline vessels, longline vessels and gill-net vessels, with some vessels fishing different gears at different times. The handlines and longlines target cod and haddock, and the gill-nets target cod and pollock.

#### ***2.1.2 Management measures***

Beyond setting the quotas, DFO management also issues species-based licenses. A series of technical measures attach to each license. They have also designated marine protected areas, although not in the Bay of Fundy.

The Canadian fisheries management system is a classic, single stock, output control supported by technical measures system. There is no official management unit one could think of as an “ecosystem”. However, a number of habitat and bycatch controls, including protections for marine mammals, are in place so that the environmental impacts of fishing activities are considered. The community quotas have also given rise to some local groups that start from the ecosystem level in considering policies and actions. On the Nova Scotia side especially, management institutions are rapidly developing toward an ecosystem perspective because the local management boards are bringing small-scale fishers and environmental activists into contact around concrete programmatic issues.

#### ***2.1.3 Stakeholder participation in planning and co-management***

The management boards are made up of fishers’ groups that represent informally both geographical sub-regions and types of gear. On the New Brunswick side, the community management board is made up of three fishers’ groups, one each for two islands and one for the mainland. These geographical divisions correspond strongly, but not absolutely, with the three types of gear. This management board divides their quota among the different gear types and each sub-group is responsible for managing one gear type. However, all three gear-type harvesting plans have to be agreed to by all three fishers’ groups. On the Nova Scotia side the board consists of two fishers’ groups, one of which loosely represents the hand-line fishers. The board has three members from each of these groups and is experimenting with having three other members representing community non-fishing interests for some issues. This board also operates by consensus.

Other stakeholder groups consist of fish dealers and some environmental conservation groups. These groups include an environmental non-governmental organization (NGO) in Halifax and another at St.

Francis Xavier University. These two groups address marine resource issues in the larger Maritimes region. Several environmental groups operate at the level of the whole Bay of Fundy and of sections and offshoots of the bay. On the Nova Scotia side, several of these groups are already cooperating closely with the community management board and this trend is growing. The community management board is, in fact, operating as a growing nexus of marine-related environmental action focussed at the ecosystem level.

#### ***2.1.4 Conflict resolution***

The current Individual Transferable Quota (ITQ)-based management system was set up by a “participatory” system in which DFO selected participants to represent the industry. There is still a great deal of resentment among the “losers” in the process, the major issue being the selection of a particular three-year baseline line to establish individual histories.

The management system is made more inclusive than the Canadian norm through the use of the management boards. This has evolved in two very different directions in the two boards. On the Nova Scotia side the community management led directly to the creation of the Marine Resource Centre, through which they are playing an expanding role in community life and including a steadily broader number of stakeholders with a self-consciously “ecosystem” approach. This has led to the inclusion of non-fishers on the Fundy Fixed Gear Council.

On the New Brunswick side there is a good deal of conflict between the three fishers’ groups that make up the board and this has led to a number of ongoing problems. While these problems have not resulted in failure, they have kept the New Brunswick side from developing the broader kinds of institutions and institutional links found on the Nova Scotia side. There are a number of explanations for this, running from the personalities of the people involved to strong differences of interest across gear type, geographical location, especially island v. mainland, and the organizational interest of the three fishers’ groups.

#### ***2.1.5 Allocation and Management***

DFO sets a Total Allowable Catch (TAC) for many important species, including groundfish, area and distributes the bulk of the quota through an Individual Transferable Quota (ITQ) system, some of the quota to the community management boards, with a small remainder of the quota being allocated to “Group X” or open access.

Quotas based on DFO’s TAC are the central management measure. The community management boards are mainly concerned with how their aggregate quotas are caught. They rely mainly on trip or weekly landing limits. These measures are made by the management boards themselves.

In the two management boards relevant to the Bay of Fundy all decisions are made by consensus. An interesting development on the Atlantic side, across the Nova Scotia peninsula from the Bay of Fundy, is that the community management boards have evolved an informal ITQ system of their own as a way to manage their aggregate quotas. On the Bay of Fundy side the fishers’ groups have resisted attempts to move in this direction.

#### ***2.1.6 Monitoring of management performance***

Stock assessments for cod, haddock and pollock are performed through formal Virtual Population Analysis (VPAs) with precautionary reference points. The DFO management system is currently examining the option of assessing the Gulf of Maine (which includes the Bay) and the Scotian Shelf stocks separately. The stocks have known biological differences such as growth rate. Sanctions for breaking the fisheries management regulations promulgated by the government are backed up by the full force of law. Community management regulations, on the other hand, are enforced more indirectly. The community management was set up, from a technical, legal viewpoint, as an “option” rather than a requirement for the small-scale boats. These boats can opt to fish for ‘Group X’ open access quota. But this quota is quickly exhausted, mainly by larger boats operating on the Scotian Shelf. The basic source of enforcement power that the community boards have is that they can refuse to allow a fisher to fish for community quota, effectively forcing this fisher into “Group X”. The community management boards have created a set of management measures rooted in this ability to

exclude those who do not respect their regulatory structure. These are effort controls aimed at spreading the community quota out over the year to avoid a race for fish. These measures are enforced mainly by fines which are imposed by an anonymous, rotating board that makes decisions about sanctions without knowing the identity of the fisher being sanctioned. This system is reported to work fairly well.

### **2.1.7 Roles and responsibilities**

Decision-making procedures in Canadian fisheries were extensively changed in the early 90s as a response to the groundfish collapse. Before the collapse, fisheries science and management was carried out by a body which had responsibility for the Atlantic zone from Labrador down to the Gulf of Maine and Georges Bank. The new system separated the science advice (DFO) from the harvesting advice (FRAC). FRAC has biologists on staff and consists of representatives from industry and academia. At the community level decisions management boards make decisions about the allocation of quota and seek to ensure that the catch is spread through the year using such measures as days-at-sea.

## **2.2 Southern African Inland Fisheries - the Case of Zambia**

### **2.2.1 Agencies and local institutions**

The Zambia Department of Fisheries (DoF) is charged with the management of Zambia's extensive fresh water fisheries. Since the late 1980s one of their central strategies has been a form of "co-management" in which village and multi-village level committees are formed and given the responsibility to enforce the government's fisheries regulations. These kinds of co-management programmes have been established in three main areas. In Lake Mweru-Luapula River system 78 Village Management Committees (VMCs) were formed with 13 zonal management committees at chiefdom or sub-chiefdom level between 1997-1999. In the Bwangweulu system, which consists of Lake Bwangweulu and the surrounding swamps, there are 39 village management committees organized into six zones each with a zonal committee. On Lake Kariba 40 village communities are organized into four zones.

### **2.2.2 Management measures**

The most important fisheries management measure is a nation-wide closed season from December through February. This time was chosen because there are many fish that spawn during this time and because it is a time of high demand for agricultural labour.

There are also a number of technical measures in the various fisheries such as controls on mesh sizes and bans on specific fishing practices. Most of these banned practices are various forms of "active" fishing, such as seining or driving fish into nets.

### **2.2.3 Stakeholder participation in planning and co-management**

Zambia is in the process of putting together enabling legislation for fisheries co-management, a process which began with proposals from the DoF in 1994. The delay is not due to the co-management provisions but to other aspects of the legislation which involve a major reorganization of the DoF. Currently the DoF operates as a small section within the Ministry of Agriculture, Food and Fisheries and does not enjoy strong access at the Ministerial level (Malasha 2002).

While this legislation is pending, the VMCs remain essentially an education and surveillance extension of the DoF, and sometimes the local Traditional Authority (TA) i.e. a king, chief or sub-chief. The VMCs are not empowered to create fisheries management measures. Currently, the DoF and the TAs are the only legal and effective authorities that can make and enforce fisheries regulations. The VMC's main function is to go on patrols and find fishers that are breaking the fishing rules. When such violations are aggravated or repeated they may fine the violators or confiscate the fishers gear, but these punishments must later be confirmed by the DoF or a TA. Village committees are quite aware of the pending fisheries legislation and its implications, but their most articulated desire for increased powers is for more formal powers of arrest rather than the ability to create fisheries rules.

The degree to which the lower-level DoF officers in the villages actually work with the VMCs is variable. In some places the relationship is not at all cooperative. This is a violation of DoF policy and reflects the attitudes of individual officers.

In all three areas the co-management projects are supposed to be funded through the collection of taxes on behalf of local authorities called District Councils. The district council is entitled to 100 kwacha for each kg of fish caught. At the present time only 10-15 percent of this revenue is ever collected. The intent is that the co-management program can facilitate the collection of these funds in return for operating funds for themselves and small-scale development programmes in the village. This cooperation with the District Councils has not yet emerged; in Lake Kariba at least this was due to the inability to agree on how the funds would be shared.

#### **2.2.4 Conflict resolution**

There is a substantial migration of fishers into the fisheries and between one fishery and another. This raises considerable tension which often takes the form of accusing the migrants of introducing damaging fishing gear. The question of how to deal with the immigrants, and what kinds of authority the committees have to deal with the immigrants, comes up often at VMC meetings. Research has suggested that these co-management committees are more effective and self-motivated institutions in areas where there are conflicts with in-migrants.

The most extreme example of such conflict took place on Lake Kariba. Lake Kariba is an artificial lake and its creation simultaneously reduced the amount of land available to the local Tonga people and attracted fishers from the rest of Zambia. Strong tensions arose both over fishing and access to land. In 1994 a donor funded fisheries co-management programme was launched through a planning workshop which was made up almost entirely of various kinds of government officials and Tonga TAs. The 2000 fishers in the fishery were represented by seven of the 56 participants (Malasha 2002). The workshop agreed that all fishers should be moved to designated fishing villages. This idea was strongly supported, and its implementation funded, by semi-industrial pelagic fishing concerns that had been losing large amounts of their catch through crew members selling fish to other fishers in fish camps, especially on islands in the lake. The implementation of this concentration affected almost entirely the immigrant fishers because fishers who also had farms, i.e. the Tonga, were allowed to keep fishing from the farms. A great many fishers resisted the exercise and chose to leave the fishery. The number of fishers fell from 2 283 in 1993 to 1 355 in 1995 (Malasha 2002). Because of their concentration in the villages, however, the immigrant fishers began to dominate elected posts in the VMCs. Tonga fishers in the villages were marginalized and the immigrants increased their control over access to both fish resources and general assistance from NGOs (Malasha 2002).

#### **2.2.5 Allocation and management**

Allocation and management is a primary issue in these fisheries. Recent combined biological and social research (Jul-Larsen et al. 2002) suggests that the pulsating water volumes that characterize most of Africa's inland fisheries, including those discussed here, create patterns of fish reproduction, growth and mortality such that overfishing from increases in numbers of fishermen has little effect. They do not extend this argument to increased fishing pressure resulting from increased capital investment and technological change, rather it is restricted to simple changes in the numbers of fishers. They further argue that African inland fisheries represent a critically important cushion against hunger within a highly variable agricultural system. They conclude from this that restrictions on access to fisheries do little to improve fisheries production while cutting off an important option for both rural households and urban consumers.

#### **2.2.6 Monitoring of management performance**

Zambian fisheries management is based on relatively little current biological information. The actual effectiveness of the implemented management measures is unknown and is being called into question (Jul-Larsen et al. 2002). The measures themselves are more effectively enforced than is often the case in Africa. The single nation-wide closed season allows the DoF, and other government agencies such as the police, to monitor the movement of fish on the highways. This makes it difficult for fish traders to take the fish to the cities and is quite effective in reducing the demand for fish in the fishing areas

during the closed season. Fishing for subsistence and some trading still goes on, but fishing activities are noticeably reduced during this period.

The DoF carries out patrols to enforce both the closed season and the technical measures, but this is not an extensive effort due to both limited resources and the co-management strategy. The VMCs also carry out enforcement patrols; it is their primary role.

### **2.2.7 Roles and responsibilities**

Co-management programmes have evolved in Zambia in various ways because of the different inceptions, particularly the different NGOs and donors involved. The Norwegian Agency for International Development (NORAD) was a driving force on Lake Kariba as was the Swedish Environmental Protection Agency (SNV) on Bwangweulu and in the Mweru-Luampula system. SNV volunteers have played a very central role in the co-management efforts until the late 1990s, since then SNV has pulled back and encouraged DoF to take a greater lead. The World Wildlife Fund (WWF) was involved in the initial stages in co-management in the Bwangweulu system but pulled back after some disagreements with the DoF. The International Union for Conservation of Nature and Natural Resources (IUCN) launched a small co-management effort in the Upper Zambezi that collapsed when the donor funding was withdrawn.

In the Mweru-Luampula system and on Lake Kariba the traditional leaders are heavily involved in the co-management. In the Bwangweulu system their relationship to the co-management efforts is more ambiguous. Here both the DoF and SNV have concluded that there is too much dependence on the chiefs in the other programmes, particularly on Lake Kariba and have adopted a policy of trying to limit TA involvement in the programme.

## **2.3 The Wider Caribbean with emphasis on CARICOM countries**

The Wider Caribbean Region<sup>1</sup> extends from the mouth of the Amazon River on the north coast of Brazil through the Caribbean Sea, including all coastal countries, to the east coast of Florida, USA and the Bahamas. There are 28 countries represented in the Wider Caribbean. Throughout the region, the majority of the population inhabits the coastal zone, and there is a very high dependence on marine resources for livelihoods from fishing and tourism, particularly among the Small Island Developing States (SIDS), of which there are 16 independent states, while all 14 of the dependent territories are SIDS.

The countries of the region range from among the largest (e.g. Brazil, USA) to among the smallest (e.g. Barbados, St. Kitts and Nevis) in the world, and from the most developed to the least developed. The World Bank classifies Aruba, Bahamas, Bermuda, Cayman Islands, USA and the US Virgin Islands as developed (high income). All other countries are developing, with most being upper or lower middle income, and two being low income. The countries of the Caribbean Community and Common Market (CARICOM)<sup>2</sup> form a political entity comprising mainly ex-British colonies, recently Suriname and Haiti have joined.

The fisheries of the Wider Caribbean Region are based upon a diverse array of resources (FAO 1993, Mahon 2002). Those of greatest importance are for offshore pelagics, reef fishes, lobster, conch, shrimps, continental shelf demersal fishes, deep slope and bank fishes and coastal pelagics. There is a variety of less important fisheries, such as marine mammals, sea turtles, sea urchins, and seaweeds.

The fisheries of the developing countries of the Caribbean use a wide variety of gear, and are primarily artisanal<sup>3</sup>, or small-scale, using open, outboard powered vessels 5-12 m in length. The most notable exception are the shrimp and demersal finfish fisheries of the Brazil-Guianas shelf, where trawlers are

<sup>1</sup> As defined by the United Nations Environmental Programme (UNEP), Regional Seas Programme. This area corresponds approximately to FAO Fishing Area 31.

<sup>2</sup> Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago.

<sup>3</sup> Fisheries and fishing vessels will be referred to as artisanal, small-scale commercial and large scale commercial. These categories provide an artificial but convenient means of referring to the scale of the fishery. Artisanal is used to refer to small traditional vessels such as canoes and pirogues using traditional gear, small-scale commercial implies vessels which are using more modern technology and gear, and are usually less than 15-18 m. Large-scale commercial refers to larger industrial vessels.

in the 20-30 m size range, and the tuna fishery of Venezuela which uses large (>20 m) longliners and purse seiners. In many countries there has been a recent trend towards more modern mid-size vessels in the 12-15 m range, particularly for large pelagics, deep-slope fishes and lobster and conch on offshore banks (FAO 2002). Given the seasonal nature of large pelagic fish availability, vessels are often multipurpose and switch between these fisheries sequentially throughout the year.

### **2.3.1 Agencies and institutions**

#### **Central agencies**

The region is characterized by a diversity of national and regional governance and institution arrangements, stemming primarily from the governance structures established by the countries that colonized the region. Owing to this and to the diversity in size and state of development of Caribbean countries, there is an extremely wide range in their capacities for fishery management.

In Caribbean countries the management of capture fisheries is the mandate of the government Fisheries Department. These vary widely in staffing and in the level of training of their staff. At the top end of the range are the USA and Mexico with substantial federal and state fisheries agencies. At the low end are countries such as St. Kitts and Nevis and dependencies such as the British Virgin Islands and Montserrat with Fisheries Departments comprising only a few persons. There has not been any systematic comparative review of the structure and function of Caribbean Fisheries Departments, but a baseline review of 12 CARICOM countries recognized a wide range of capability even within these countries, which are all at the lower end of the capacity scale (Mahon and Boyce 1992).

Whereas one ministry has primary responsibility for fisheries, several others usually have an important role to play in fisheries development and management: ministries of foreign affairs are key players in any approach to management that involves international relations, which given the proximity of states in the Caribbean often involves small-scale fisheries; trade ministries are key to fisheries that export, e.g. conch and lobster; certification and Hazard Analysis Critical Control Point (HACCP) management are often under the control of health ministries; enforcement is usually a matter for the Coast Guard. However, cross-sectoral coordination and cooperation is a weak area for many Caribbean countries.

In addressing the management regime for small-scale fisheries in Caribbean countries, it is necessary to consider the possible role of other institutions with expertise in marine resource management and maritime affairs as sources of technical input, when fisheries departments are weak. Many larger countries in the Wider Caribbean have universities and institutes that can provide expertise, or be encouraged to develop programmes that support fisheries management, e.g. USA, Mexico, Cuba, Venezuela and Colombia. There are few such institutions in the small, less-developed countries. In CARICOM countries, there are the University of the West Indies, the University of Guyana and the University of Suriname. These have very limited capacity in the area of fisheries and oceanography.

National agencies must be considered in the context of the several regional initiatives aimed at enhancing capacity for management of small-scale fisheries through coordination, sharing of information and pooling of resources. Some examples are: the Western Central Atlantic Fisheries Commission (WECAFC) of the Food and Agriculture Organization of the United Nations (FAO) which has been a primary forum for fisheries personnel to exchange technical information; Latin American Organization for Fishery Development (OLDEPESCA) which is the successor to the SELA Action Committee on Seafood and Freshwater Products; The CARICOM Caribbean Regional Fisheries Mechanism (CRFM), a permanent regional fisheries mechanism which was recently established (March 2003) to provide support to its member countries; United Nations Educational, Scientific and Cultural Organization (UNESCO), International Oceanographic Commission, Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE), Colombia. The influence of these has been mainly at the technical level. A few other regional organizations have a mandate to facilitate regional-level management of fishery resources, to promote interchange of information and to build marine science capacity but are little involved in direct management.

The need for regional cooperation in fisheries management as a means of enhancing capacity of small fisheries departments is well appreciated, but there is a large number of agencies in the mix. These often compete for the attention of the relatively small number of staff in fisheries departments and may at times even duplicate efforts.

The role of international agencies e.g. The International Commission for the Conservation of Atlantic Tuna (ICCAT) must be borne in mind as many Caribbean small-scale fisheries exploit tuna resources and must be managed with reference to ICCAT.

### **2.3.2 Management measures**

Traditional management measures have not been reported to occur in many places in the Caribbean. It has been argued that most Caribbean peoples are not indigenous and thus being relative newcomers to the area there may not have been sufficient time for traditional management to develop as it has elsewhere, for example in Oceania. There are some examples of traditional measures, e.g. rules to reduce conflict in Grenada seine fisheries and promote conservation in Barbados sea urchin fisheries. Perhaps other examples exist, but not much effort has gone into finding them in the Caribbean.

The main means of regulating small-scale fisheries has been area and seasonal closures, gear regulations, chiefly mesh size of traps and nets, but also banning of scuba, and banning of destructive fishing practices such as blast fishing and trammel nets. In cases of extreme depletion, such as is often the case for easily exploited inshore resources like conch and sea urchins, there have been complete closures for extended periods.

Limited access is almost unheard of in small-scale fisheries in the Caribbean, except in Cuba and US territories. Such fisheries are often perceived as a last-resort means of making a living for the poorest persons. Thus preventing them from fishing is seen as taking away any chance of making a living and is politically unacceptable.

### **2.3.3 Stakeholder participation in planning and co-management**

Stakeholder involvement in planning and/or the management process is a very new concept in the Caribbean. Fisheries Advisory Committees (FACs) are about as far as it goes in most countries, and FACs are seldom very active or influential. Exceptions exist, such as in the case of the Belize Fisheries Advisory Board, which plays a strong role.

Consciousness regarding the need to involve stakeholders in planning and management is growing in the region. There are several recent projects aimed at studying and enhancing co-management. Much of the effort aimed at involving stakeholders relates to the management of marine protected areas and is conservation rather than fishery oriented, although fisheries objectives are often cited with the hope of engaging fishers.

At this time, consultation is the main mode of involving stakeholders in fishery management. There are few reported examples of fishery co-management in the Caribbean involving the delegation of management authority to stakeholders. The Portland Bight and Negril Management Areas in Jamaica are notable examples in which authority for management of the fisheries in a designated area has been delegated to an NGO. Both cases are relatively new and it is too early to determine if they are sustainable.

### **2.3.4 Fishery organizations**

Attempts at establishing fisheries cooperatives have a long history throughout the Caribbean. However, there are few examples of cooperatives that have become strong and sustainable. The cooperatives in Belize are the best known examples. They are based primarily on the valuable conch and lobster fisheries there, and have played a central role in processing and exporting. Similarly in Guyana, the Georgetown Cooperative has been strong and active in managing the fisheries complex there. Recent initiatives have been more oriented towards promoting fisherfolk organizations, as interest groups, rather than cooperatives as economic entities. The stated purpose of these initiatives has been to give fisherfolk a collective voice in management. This has been recognized as being particularly needed in countries where there is a strong tourism sector, which tends to compete with fisheries for marine and coastal space. In many countries small-scale fisheries have been marginalized by tourism. At the same time, the tourism sector complains about lack of availability of fishery products. There is the need for such organizations to demonstrate successes in order to convince the wider fisherfolk community that they are worth supporting. At present they tend to be supportive only in times of crisis. To achieve the successes needed to gain credibility, considerable strengthening

through capacity-building and ongoing support in planning and implementing activities will be required (McConney et al. 1998).

### **2.3.5 Conflict resolution**

Conflict management among stakeholders through negotiation and mediation is not the cultural norm in most CARICOM countries. Mediation is only recently being seen as a useful complement to the judiciary system in most Caribbean countries. These types of skills are rarely present in government fisheries divisions, given the primarily biological background of staff in most cases, and even more rare in fisherfolk organizations. Berkes et al (2001) point out that the role of the fisheries officer is changing, particularly with regard to small-scale fisheries, where management may be more people-based than science-based, towards one where mediation, facilitation and organizational skills will be most important. There is the need to ensure that managers have these skills.

### **2.3.6 Allocation and management**

Attempts to allocate resources to different user groups are primarily through zoning, involving Marine Protected Areas (MPAs) in particular. In the case of MPAs, fishers are prevented from fishing, or restricted in how they may fish, usually in favour of tourism but also for conservation purposes. However, most MPAs in the Caribbean are “paper parks” with little enforcement of restrictions.

Given the lack of limited entry or controls on total allowable catch in most Caribbean countries there are few reported examples of resource allocation among users within fisheries. Conch in Jamaica is a notable example where spatial and allowable catch limitation were placed on the large commercial vessels in favour of small-scale fishers on Pedro Bank (Aiken et al. 1999). Zoning is also used to separate activities of small-scale and large-scale commercial fishing in shrimp fisheries in Trinidad.

### **2.3.7 Monitoring of management performance**

Few countries have fishery management plans that require systematic review of management performance. Thus there is little information upon which to base comments. Monitoring the status of fisheries is one key means of determining if management is working. Time series of landings and catch per unit effort are basic data for such monitoring. Establishing catch and effort monitoring systems in Caribbean countries has been a major thrust of the CARICOM Fisheries Programme over the past 12 years. However, in most countries it is usual to find data being collected according to a routine with little analysis beyond the simple statistical output of reporting annual production figures for national and international organizations (FAO 2002).

### **2.3.8 Roles and responsibilities**

Management in Caribbean countries remains essentially top-down, with consultation. Consequently, given the difficulties involved in dealing with widely dispersed, mainly rural small-scale fisheries, little management actually takes place. Closed seasons for species that are primarily exported are most strictly observed, because they can be controlled through export permits, although in some places over the side sales to vessels from neighbouring countries with different closure periods is problematic. In the eastern Caribbean, harmonization of regulations among countries helps to address this problem. There is widespread recognition that comanagement is desirable, but neither government nor stakeholder organizations are equipped to move rapidly in that direction.

Conservation NGOs are having an increasing influence on small-scale fisheries in the Caribbean, primarily through the promotion of MPAs as a management tool. Regional and national NGOs also promote protected areas, but are much less strong less well funded than their international counterparts. The situation with fisherfolk NGOs has been described above. In the Portland Bight area mentioned above, the use by the managing NGO of local rangers for enforcement is reported as working well.

### 3. ISSUES FOR MANAGEMENT REGIMES

The following five issues were identified as key for consideration in developing a research programme for small-scale fisheries:

1. Lessons from fisheries co-management.
2. Small-scale fisheries management and ecosystem management.
3. High diversity of small stocks of low total individual value that does not justify a full conventional stock assessment, target setting and enforcement programme.
4. Low perceived importance of fisheries in general and small-scale fisheries, in particular.
5. Small poorly managed, unplanned fisheries departments that do not have the range of expertise needed to conduct conventional top-down management using assessment-based targets.

#### **Issue 1: Lessons from fisheries co-management<sup>4</sup>**

Co-management is a rapidly expanding model for fisheries management that has enjoyed wide support by both donor agencies and NGOs. Sen and Nielsen (1996) define co-management as: "an arrangement where responsibility for resource management is shared between the government and user groups" (406). McCay and Jentoft (1996) are more specific when they describe co-management as cooperative fisheries management where "the basic principle is self-governance, but within a legal framework established by government, and power is shared between user groups and the government" (239). Co-management mobilizes several assets to aid effective management. One is facilitated access to information (Pinkerton 1989). Others are increased legitimacy through increased transparency in decision-making (Jentoft 1989), greater accountability for officials (Magrath 1989), and increased respect for indigenous perspectives (Pomeroy and Carlos 1997). Co-management has a mixed record of success (Wilson, Nielsen and Degnbold 2003) but the most effective small-scale fisheries management institutions are, to a growing degree, co-management institutions (Raakjaer-Nielsen *et al.* 2002).

Considerable recent research has focussed on what does and does not contribute to strong co-management institutions (Raakjaer-Nielsen *et al.* 2002, Wilson Nielsen and Degnbold 2003). The first lesson, perhaps, is that co-management must involve real cooperation. Where co-management is simply a recruiting tool for inexpensive labour to help the government to enforce its fisheries regulations it is unlikely to succeed. Even if the co-management institutions are maintained, they will not make the contribution to effective management that truly collaborative approaches can make (Raakjaer-Nielsen *et al.* 2002).

The second lesson is that co-management institutions that are based on the democratic representation of the fishers have more depth and staying power than those that are not. Hara *et al.* (2002) in their comparative case studies of co-management in Malawi found that close involvement by non-democratic traditional authorities (TA) had a negative influence on the effectiveness of the management regimes. Similar lessons are emerging from community-based natural resource management approaches to many resources throughout the world (Ribot 2002).

Effective environmental management is management that can process and respond well to biological and social information, i.e., management that is adaptive whether it uses that term or not. One way to think about the contribution that co-management can make to fisheries management, and the motivations behind participation in such programmes, is to look at the problem in terms of information processing across scales. The smaller the scale an institution is operating on the better able it is to understand and respond to rich, nuanced information. When seeking to manage large-scale problems, governments rely on bureaucratic authority, and sometimes market-based mechanisms, because these approaches create cooperation through simple decisions in response to strong, clear incentives that operate predicably across large scales. Markets and bureaucracies, however, are poor at processing and responding to complex information, such as scientific data about rapidly changing fisheries (Wilson 2003).

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<sup>4</sup> Much of the material in this section is taken from Wilson (2003) and expanded upon.

The problem that governments face when they seek to manage small-scale fisheries is accountability. How can the government know and influence the kinds of decisions and behaviours that are going on at the local level so that they can ensure that they reflect the government's priorities for, e.g., the sustainable and equitable use of a large-scale resource? In creating co-management institutions, the government desires to make use of the richer information processing mechanisms embedded in local cultures to facilitate this accountability. The government's motivation for participating in co-management begins with its need for the communities' help in dealing with aspects of management that require richer, more sensitive and subtle tools than bureaucratic authority provides.

Fishing communities, meanwhile, want to access the government's higher-scale reach and resources. Two reasons why communities want to involve the government in local fisheries management are common. The first is simply a desire for the money and other resources that co-management programmes frequently make available. In such cases, the community will remain motivated to participate in co-management so long as the money is flowing. The second reason is that the community is facing a conflict situation and wants the government to help them deal with it. For these communities, government involvement holds two attractions: giving legitimacy to particular objectives and local groups, and managing the broader conflicts.

Stakeholder conflicts in fisheries are situations of both problem and possibility. It is communities that need government help in resolving conflicts that are the most ripe for the creation of effective, self-motivated, co-management institutions. Such institutions can be of great use, in turn, to a government trying to hold a local community accountable to a larger scale need. Situations where co-management has the greatest possibility for success will often be situations of conflict.

Of course, conflicts also undermine management efforts. In the Canadian case described above the community management boards were invested with government legitimacy to resolve the conflicts that emerged in the sharing of a decreasing groundfish quota. The ongoing need to deal with these conflicts has meant that both of the boards have continued to function, but one board has proved a stronger institution because of a larger capacity for conflict resolution.

Effective co-management will come about when the government can use its authority to contain and channel fisheries conflicts in creative ways. This means using its rule-making authority to make it possible for more open and culturally embedded communications to play an effective role in conflict resolution and other local decision-making processes. Other examples beyond the Canadian case exist (Wilson Nielsen and Degnbold 2003). The creative channelling of conflict does require, however, that the state use its authority for this purpose rather than attempting to micro-manage the fishery. The benefits of co-management are best achieved when the state is willing to surrender real decision-making power, including the legitimacy that only the government can bestow, to democratic local institutions, even while holding them accountable for their responses to the needs of the broader society.

Such accountability itself can, in fact, increase the effectiveness of co-management institutions when it takes the form of ongoing, outside participation in goal clarification and the evaluation of achievements. This is true both of co-management programmes involving the state and emerging possibilities of ecolabelling in small-scale fisheries management in which certification programmes use the high scale power of the market, rather than of the state, to achieve a similar purpose. There are a great many problems involved in certification of small-scale fisheries, but this approach does hold real potential if it is conceived as a mechanism of ongoing accountability to locally created and globally ratified management goals that strikes the right balance between firm accountability to goals and transparency about ways to achieve those goals.

## **Issue 2: Small-scale fisheries management and ecosystem management**

Making use of the richer information that smaller scale institutions are able to work with is the key to understanding the ecosystem management problem. Ecosystem management has emerged in several forms in discussions of fisheries management (McCay and Wilson 1997). Approaching fisheries management from an ecosystem perspective is biologically attractive because of its recognition of the reality that fishing is related to a far broader set of problems than simply the impact of harvesting on populations. It is also enormously challenging. In a number of contexts it has been defined as

“multispecies management” wherein a management is designed around several interacting species. Ecosystem management has also been promoted by those seeking fundamental reforms in the way we defined fisheries management, on such example being the “parametric management” approach of Wilson and Dickie (1995). Most scientific approaches to ecosystem management, however, use multi-species models that essentially treat ecosystem management as single species management. This leads to overwhelming measurement and analysis problems (Degnbol 2003). From a social perspective, ecosystem management would also result in an exponential increase in the number of groups that would have a stake in any given decision. In fact, the complexity that the management of the marine ecosystem would entail would likely overwhelm any current management institution. Nor do ecosystem approaches reflect the realities of managing behaviour through bureaucratic authority. Bureaucracies depend on calculable rules to trigger responses (Porter 1995), while ecosystem approaches present complex interactions of parameters that are difficult to quantify and impossible to interpret in real, decision-making time. More fundamental, the concepts needed to make ecosystem management work do not translate into firm, legal definitions, even ones as simple as boundaries (Haueber 1996). Ecosystem approaches depend on the flexibility to make changes in response to shifting system parameters.

The bottom line from these scientific, social and bureaucratic considerations is that ecosystems are not a unit of management that is congruent with democratic, science-driven management as it is carried out on large scales through government bureaucracies. Studies of the application of the ecosystem concept in environmental management in practice have demonstrated this empirically (Yaffee 1996). What cannot be done on large scales, however, may be feasible on small scales. Ecosystem management requires the processing of too much biological and social information for large bureaucracies to handle. The ability of institutions on smaller scales to make use of more and more nuanced information suggests that small-scale fisheries are where experiments with real ecosystem management need to begin.

The Canadian experience described above is one instructive case. The community management boards emerged to deal with conflicts created by the allocation of an aggregate quota. In the one case where they were successful in dealing with these conflicts the local institution, rather than simply carrying on with that task, began to be involved in a wider and wider set of problems related to the management of the Bay of Fundy. They are now centrally involved in a network of local groups focussed on management issues around the Gulf of Maine. Nor is this the only case; the increasing involvement of the Sea Fisheries Committees that handle small-scale fisheries management in the UK, with the management of EU Special Conservation Areas, are another example. Co-management systems that incorporate the principles outlined in Issue 1 may be one key to making the kinds of changes in human management institutions that will make ecosystem management a feasible alternative.

### **Issue 3: High diversity of small stocks of low total individual value that does not justify a full conventional stock assessment, target setting and enforcement programme**

Although, for discussion purposes, small-scale fisheries are often treated as a discrete category, they are in fact a continuum of fishery types from very small, subsistence to enormous, industrial. There may be some value in developing ideas relating to this continuum further as a basis for considering problems of small-scale fisheries. For example, are the types of problems often flagged as relating to small-scale fisheries due to the scale of the fishery, the size/value of the fish stock being exploited or the type of management regime that is often found in situations where small-scale fisheries are prevalent? Unravelling this is clearly beyond the scope of this brief report, but it may be possible to raise some points that can be considered in further discussions.

Taking the above three dimensions may provide a useful framework for considering small-scale fisheries issues. It encompasses all fisheries.

Dimension 1 is the **scale of the fishery**, ranging from subsistence through artisanal, small-scale commercial to large-scale commercial or industrial.

Dimension 2 is the **size/value of the stock fished**, which may range from a few tonnes to over a million tonnes.

Dimension 3 is the **management organizational context**, ranging from a very small fisheries management organization with low capacity and low related support to a large, fully developed management system with science, administrative, enforcement and judiciary support.

These dimensions are not unrelated and have other correlates such as temperate-tropical axes and developed-developing country axes, that make it difficult to frame the problems seen in small-scale fisheries as purely due to the scale of the fishery. Ideally, to explore this approach, one would look at the distribution, relative frequency of occurrence, and total value (dollar, employment, food security) of global fisheries in this three-dimensional space. Then the issues relating to management for the different parts off the space could be considered, with reference to possible solutions and the appropriate investment of research and management effort according to value. That would be a substantial research effort in itself, largely because the data on stock size/value is scarce. Much fishery data is reported in aggregate form, certainly at the national level, without regard to stock unit size. Some observations on the characteristics of fisheries that occur in different parts of the three-dimensional space are provided in Table 1. These illustrate possible different needs for small-scale fisheries in different situations. This table is not intended to be comprehensive, but rather to illustrate an approach to expanding upon the usual small-scale/large-scale continuum and to emphasize that many apparent problems of small-scale fisheries may not be due only to the scale of the fishery.

**Table 1. Characteristics and issues for management of small-scale fisheries in various parts of a management regime framework based on three dimensions: Management organization and capacity; stock size; and fishery scale**

Management organization and capacity	Fishery scale	Stock size	Characteristics	Management issues
<b>A. Well developed (usually developed country)</b>	<b>i. Small</b>	<b>a. Small</b>	Small-scale fisheries on small stocks are common in developed countries, often by indigenous peoples and in rural areas.	These fisheries tend to be less well managed than the larger scale fisheries on large stocks as the latter are higher priority. However, they do get some spin-off attention from the capacity that is there to deal with large-scale/large-stock fisheries. In particular, when politically necessary, resources can be diverted to these fisheries.
		<b>b. Large</b>	These are usually part of a fishery system that includes large-scale fishing.	These fisheries tend to get management attention as part of the management package for the large-scale fisheries, or take too small a proportion of the stock to have an impact
	<b>ii. Large</b>	<b>a. Small</b>	Few large-scale fisheries tend to develop on small stocks, except where there are many of them in close proximity. Offshore salmon would be an exception, where the aggregate of the small stocks is large.	These stocks usually get management attention due to the aggregate value and profile of the industry.
		<b>b. Large</b>	These are the major resources upon which most of conventional fishery management and assessment has focused.	Poor history of management, but nonetheless sufficiently valuable that managers continue to invest resources into assessing and managing.
<b>B. Poorly developed (usually developing country)</b>	<b>i. Small</b>	<b>a. Small</b>	Globally there must be a very large number of such fisheries. Characteristically, these will be tropical, rural, coastal and inland (similar to A.i.a).	Individually, these fisheries are not sufficiently individually valuable to warrant conventional approaches. Technically, assessing them and making management decisions using conventional management approaches would require similar levels of expertise and institutional arrangements as management of a large, valuable stock. This is seldom economically justifiable. Consequently, they receive little or no management attention (unless traditional management practices are in place). Their small size means that they are vulnerable to depletion by small-scale, local fisheries.
		<b>b. Large</b>	These are usually part of a fishery system that includes large-scale fishing (similar to A.i.b)	These fisheries may take only a small proportion of the total catch and may tend to be marginalized even when there is substantial management attention on the large-scale fishery for the stock.
	<b>ii. Large</b>	<b>a. Small</b>	Few large-scale fisheries tend to develop on small stocks, except where there are many of them in close proximity. No developing country examples come to mind.	If large-scale fisheries have developed on small stocks in countries with poor management, they usually attract outside attention, often because the fishery is based on outside investment.
		<b>b. Large</b>	These are also the major resources upon which most of conventional fishery management and assessment has focused. These fisheries often attract foreign investment and distant water fleets.	The value of, and foreign interest in these fisheries may lead to greater attention to assessment and management.

Inventory of the relative distribution of stocks in this framework (or some variation) would provide the context for a research programme on small-scale fisheries that focussed on the relevant characteristics (Mahon 1997). For small size/value stocks there is the need to develop approaches that are indicator-based rather than conventional stock assessment, use reference directions rather than targets and emphasize consensual processes (Berkes *et al.* 2001).

#### **Issue 4: Low perceived importance of fisheries in general and small-scale fisheries in particular**

In CARICOM countries, with the exception of shrimp fisheries in Guyana and Suriname, and lobster and conch fisheries in Belize, fisheries are generally perceived to be of low importance relative to other productive sectors. One reason suggested is that Fisheries Divisions are usually situated in ministries that are primarily concerned with agriculture. The backgrounds of the Chief Technical Officer, Permanent Secretary and Minister are usually agriculture related. Furthermore, because fisheries are mainly small-scale and often rural, fishers are usually from the lowest economic strata and have little voice, except when there are crises. By and large, small-scale fishing is perceived by planners and decision-makers as a subsector that takes care of itself. Despite clear evidence of overexploitation of most coastal resources, there is reluctance on the part of decision-makers to actively manage these resources. Left alone, the small-scale fishers go about their business quietly, but with low returns from depleted resources. Attempts to impose management regulations on them often leads to unfavourable political exposure due to the perception that the livelihoods of the poor fisher is being threatened.

Where tourism is an important sector, small-scale fisheries are often marginalized by demands for coastal space, particularly in SIDS where space is limited. There is little in the way of integration of fisheries with tourism. Important linkages wherein fisheries provide inputs to the tourism restaurant sector and thus considerable value added when the product is served as a meal, rather than exported, are often overlooked.

The above situation has been exacerbated by the lack of good information on the value of fisheries, and/or the potential benefits from fisheries management. As a consequence, fisheries management controls are minimally developed and seldom enforced in CARICOM countries. The situation appears to be similar in other developing countries of the Wider Caribbean, with the exception of Cuba, where there is evidence that management control has brought benefits in several fisheries (Claro *et al.* 2001).

Little emphasis has been placed on quantifying and promoting the importance of small-scale fisheries in CARICOM. It may be thought that when there are good functioning data systems for monitoring fisheries performance these will provide the necessary information. After 12 years of work on data systems by the CARICOM Fisheries Programme, there has been little output oriented towards documenting the value of small-scale fisheries.

Proper economic valuation of the value of small-scale fisheries in national economies would go some way towards redressing this situation. In countries with tourism, this must include the value added by providing inputs to tourism. Often these are counted under tourism earnings. However, knowing the value although necessary is not sufficient. There is the need to communicate this to decision-makers and the public at large. The collective voice that fisher associations should give fishers could make a substantive contribution to raising the profile of small-scale fisheries and an appreciation of their value.

Programmes to quantify the occurrence, and value of small-scale fisheries would help to redress this problem. Often, when one refers to valuation of small-scale fisheries, the response from national agencies is that it would require major social and economic surveys, the cost of which could not be justified. Berkes *et al.* (2001) suggest that the information could be acquired at the level of accuracy needed to persuade the public and decision-makers through much simpler surveys than are often proposed. Development, documentation and sharing of simple reasonable methods for arriving at estimates of small-scale fisheries value and value added would assist in addressing this need. These methods could focus on the use of single/one-off studies at intervals (e.g. 5-10 years), rather than on setting up ongoing systems for monitoring economic performance. The latter although possibly

necessary for monitoring fisheries performance for management do not seem to capture small-scale fisheries information in a form needed to document and promote their value.

**Issue 5: Small poorly-managed, unplanned fisheries departments that do not have the range of expertise needed to conduct conventional top-down management using assessment-based targets**

Problems relating to the actual organization and operation of fisheries departments in countries where small-scale fisheries are predominant may be one of the major reasons for the poor management of these fisheries. This is particularly so when conventional management approaches are perceived as being the desired, if not the only, approach to managing these stocks. This has been considered to some extent under Issue 3 above, but bears further examination. For a start, there is the need to consider the extent to which small-scale fisheries require a completely different structure and staffing of fisheries departments compared to that of large-scale conventional fisheries management. As previously described in this paper, most fisheries departments have a bias towards biological expertise with limited skills in facilitation, mediation and conflict resolution. Furthermore, even the dominating biological expertise is not the most appropriate biological expertise for dealing with the complexity of small-scale fisheries.

The lack of guidelines for appropriate expenditure on management for a given resource value (if it were known) is a root cause of the evident lack of planning in CARICOM countries for human resource development for fisheries departments that includes clearly stated structures and targets. This has contributed greatly to the instability in fisheries departments. Because there are no guidelines, fisheries department size and structure has generally been an ad hoc decision based on the decision-makers perception of the value of fisheries, and the persuasive power and/or position of favour, of the department chief. This issue is closely linked to the one above regarding low perceived value of small-scale fishery resources, particularly when the whole fishery sector is a suite of small-scale fisheries on small/low individual value stocks (regardless to the overall value of the sector).

It appears obvious that the level of investment in management should generally be related to the value of the resource (that may include non-fishery worth such as for biodiversity, culture, religion or ecosystem integrity). However, there is a lack of analyses that lead to easily applicable formal or informal rules to guide the manager in determining an appropriate level of investment. Indeed there are few studies that even quantify existing levels of investment (Arnason, Hannesson and Schrank 2000). For large-scale fisheries in developed countries, the costs of management may be substantial and variable, ranging from 3 percent of the value of the fishery in Iceland through 10 percent in Norway to 15-25 percent in Newfoundland, Canada (Arnason, Hannesson and Schrank 2000). This is an area in which there is the need for further analysis by fisheries economists with the aim of providing managers with at least some rules-of-thumb regarding appropriate levels of investment.

The approach of quantifying the costs of not managing in order to determine an appropriate level of expenditure on management should be explored. There can be many social and economic impacts of not managing a fishery (Berkes *et al.* 2001). Incentives for investment in management may be higher where the fishery has additional value to the country, such as providing foreign exchange, or where the fishery products are culturally important. In the latter case, the value placed on a fishery may be much higher than its measured economic value.

Serious attention to the economic value of fisheries and guidelines for the appropriate levels of national budget for management could provide a basis for more planned and structured departments.

Even if there were a clear view of the appropriate amount of public investment in fishery management and development, there is little to guide the manager as to the appropriate organizational arrangements for a developing country fisheries department. Attention to guidelines for fisheries department structure and function could make a substantial contribution to the effectiveness of developing country fisheries departments. There is a large sample of developing country fisheries departments from which to learn what has worked, what has not, and why. An international study of existing arrangements in the context of various organizational models is called for.

Many developing country department chiefs appear to take the view that in order to manage fisheries effectively they need the full range of skills and positions that are commonly found in a large-country department such as the Department of Fisheries and Oceans, Canada or the National Marine Fisheries Service (NMFS) in the USA. Their training and their post-training exposure, frequently lead them to conclude that management cannot be successfully carried out without such levels of input.

In addition to exploring the most appropriate model for fisheries departments of various sizes and with a mandate for various levels of resource value, there is the need to consider the relative capacity that should be established in national and regional institutions. Models of national/regional arrangements that take advantage of limited resources are only now beginning to emerge (Sydnes 2001). This further complicates the matter of national investment in management, because regional institutions must be supported from national funds, usually at the expense of the national institutions. Thus it can be expected that, in addition to collaboration between the two levels, there will be tensions.

The matter of how fisheries departments are run and of accountability bears further exploration. When there is no plan that sets priorities for a period and is reviewed on a regular basis, there is scope for a great deal of ad hoc activity on the part of fisheries department staff. This activity may be opportunity-driven by offers of travel to workshops and training. Travel with associated per diems may increase annual salaries of fisheries officers substantially. Consequently, in the absence of transparent planning, activities that include well-paid travel may get priority.

In small fisheries departments that do not operate according to clear plans that are developed with stakeholders and reviewed regularly, individual agendas may exert a strong influence over the department's priorities. For example, a fisheries officer with strong inclinations to reef conservation may shift the departmental focus in this direction while providing limited attention to offshore fisheries. Formal planning can provide balance and prioritization that can help to overcome these effects.

At the national level, the mechanism for fisheries management planning and decision-making is critical for successful management. The lack of political will to regulate users is a common cause of failure in fisheries management. Fishers inevitably suffer genuine short-term hardship due to regulations, and the political directorate will often favour their short-term needs over the long-term sustainability of the resource. One way to mitigate this may be to formalize the advisory and decision-making process so that fishers inputs are incorporated, long-term versus short-term benefits are documented, and it thus becomes more difficult for the political directorate to ignore the advice.

In summary, the structure and function of developing country fishery departments based on levels of financial support that are appropriate to the value of resources to be managed have not been systematically addressed. Similarly, although the need for improved planning and review processes is frequently identified, there is little to guide managers in these areas. Consequently, systematic action to address these issues has been minimal.

This is an area within which there is great potential for input from the field of organizational change management and public administration, perhaps even considering the applicability of some of the recent thinking on complex adaptive systems and organizational change (Olson and Eoyang 2001). A research programme could be developed to address the areas identified above.

## REFERENCES

- Aiken, K.A., Kong, G.A., Smikle, S., Mahon, V. and Appeldoorn, R. 1999. The queen conch fishery on Pedro Bank Jamaica: Discovery, development, management. *Ocean and Coastal Management*. 42: 1069-1081.
- Arnason, R., Hannesson, R. & Schrank, W.E. 2000. Costs of fisheries management: the cases of Iceland, Norway and Newfoundland. *Marine Policy* 24: 233-243.
- Berkes, F., Mahon, R., McConney, P., Pollnac, R. & Pomeroy, R. 2001. Managing small-scale fisheries: Alternative directions and methods. IDRC, Ottawa, Canada, 308 p.
- Chakalall, B., Mahon, R. & McConney, P. 1998. Current issues in fisheries governance in the Caribbean Community (CARICOM). *Marine Policy*, 22: 29-44.
- Claro, R., Baisre, J.F., Lindeman, K.C. & Garcia-Arteaga, V. 2001. Cuban Fisheries: historical trends and current status. Pp. 194 – 219 In. *Ecology of the Marine Fishes of Cuba*. Smithsonian Institution Press, Washington.
- Degnbol, P. 2003 "Conflict and Scale: a Defence of Community Approaches in Fisheries Management" *forthcoming* in Wilson, D.C., J.R. Nielsen and P. Degnbol (Eds) The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects Dordrecht, The Netherlands: Kluwer Academic Publishers
- FAO. 1993. Marine fishery resources of the Antilles. FAO Fisheries Technical Paper No. 326.
- FAO. 2002. Preparation for expansion of domestic fisheries for large pelagic species by CARICOM countries. Large pelagic fisheries in CARICOM countries: assessment of the fisheries and options for management FI: TCP/RLA/0070 Field Document No. 1, 157 pp.
- Hara, M. S., Donda & Njaya, F. 2002. "Lessons from Malawi's experience with fisheries co-management initiatives" in Gehab, Kim and M-T Sarch Africa's Inland Fisheries: The Management Challenge Kampala: Fountain Publishers.
- Haeuber, Richard. 1996. "Setting the Environmental Policy Agenda: The Case of Ecosystem Management" *Natural Resources Journal* 36 (Winter): 1-28.
- Jentoft, S. 1989. "Fisheries Co-management" *Marine Policy* 13:137-154.
- Magrath, W. 1989. "The Challenge of the Commons: the Allocation of Nonexclusive Resources" World Bank: Environment Department Working Paper #14.
- Mahon, R. 1997. Does fisheries science serve the needs of managers of small stocks in developing countries? *Can. J. Fish. Aquat. Sci.* 54: 2207-2213.
- Mahon, R. 2002. Living aquatic resource management. pp. 143-218. In: *Natural Resource Management for Sustainable Development in the Caribbean*. Edited by I. Goodbody and E. Thomas-Hope. Canoe Press, Jamaica.
- Mahon, R. & Boyce, S.L. 1992. CARICOM Fisheries Resource Assessment and Management Program Baseline Survey of Fisheries Division in participating countries. CARICOM Fishery Research Document No. 5: 72 pp.
- Jul-Larsen, E., Kolding, J., Overå, R., Raakjær Nielsen, J. & van Zwieten, P.A.M. 2002. Management, co-management or no management? Major dilemmas in southern African freshwater fisheries. Part 1: Synthesis Report, FAO Fisheries Technical Paper 426/1. Rome, 2002. Part 2: Case studies, FAO Fisheries Technical Paper 426/2. Rome.
- Malasha, Isaac 2002 "The Outcome of a Co-Managerial Arrangement in an Island Fishery: The Case of Lake Kariba (Zambia) pp 89-106 in Gehab, Kim and M-T Sarch Africa's Inland Fisheries: The Management Challenge Kampala: Fountain Publishers
- McCay, B.J. & Jentoft, S. 1998 "Market or Community Failure? Critical Perspectives on Common Property Research" *Human Organization* 57(1):21-29.
- McConney, P.A., Atapattu, A. & Leslie, D. 1998. Organizing fisherfolk in Barbados. *Proc. Gulf Carib. Fish. Inst.* 51: 299-308.
- Olson, E. E. & Eoyang, G.H. 2001. Facilitating organization change: lessons from complexity science. Jossey-Bass/Pfieffer, San Francisco, 191 p.
- Pinkerton, E. 1989. "Introduction: Attaining Better Fisheries Management through Co-Management - Prospects, Problems and Propositions" Pp. 3-36 in E. Pinkerton (Ed) *Cooperative Management of Local Fisheries*. Vancouver: University of British Columbia Press.

- Pomeroy, R.S. & Carlos, M.B. 1997. "Community-based coastal resource management in the Phillippines: a review and evaluation of programs and projects, 1984-1994" *Marine Policy* 21(5):445-464
- Porter, T.M. (1995). Trust in Numbers: the Pursuit of Objectivity in Science and Public Life Princeton: Princeton University Press.
- Raakjær Nielsen, J.P.D., Kuperan Viswanathan, K. & Mafuzuddin, A. "Fisheries Co-Management - An Institutional Innovation. Perspectives and Challenges Ahead" Paper no. 216, IIFET 2002 Conference, August 19-22, Wellington, New Zealand.
- Ribot, J.C. 2002. Democratic Decentralization of Natural Resources: Institutionalizing Popular Participation Washington DC: World Resources Institute.
- Sen, S. & Raakjr-Nielsen, J. 1996. "Fisheries co-management: a comparative analysis" *Marine Policy* 20(5):405-418.
- Sydnæs, A.K. 2001. Regional Fishery Organizations: how and why organizational diversity matters. *Ocean Development & International Law* 32: 349-372.
- Wilson, D.C. & McCay, B. J. 1998. "How the Participants Talk About Participation in Mid-Atlantic Fisheries Management" *Ocean and Coastal Management* 41:41-61.
- Wilson, D.C., Nielsen, J.R. & Degnbol, P. 2003. (Eds). The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Wilson, D.C. 2003. "Conflict and Scale: a Defence of Community Approaches in Fisheries Management" *forthcoming* in Wilson, D.C., J.R. Nielsen and P. Degnbol (Eds) The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Wilson, J.A. & Dickie, L.M. 1995. "Parametric Management of Fisheries: An Ecosystem-Social Approach" pp 153-165 in Hanna, S. and M. Munasinghe (Eds) *Property Rights in a Social and Ecological Context: Case Studies and Design Applications* Washington: The Beijer International Institute of Ecological Economics and the World Bank.
- Yaffee, S.L. 1996. Ecosystem Management in Practice: The Importance of Human Institutions. *Ecological Applications* 6(3): 724-727.