

Review of the state of world marine capture fisheries management: Indian Ocean



Cover photograph:
Local fishing landing site. Ikoni, the Comoros.

Review of the state of world marine capture fisheries management: Indian Ocean

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Preparation of this document

This document was prepared as part of the on-going activities of the FAO Fisheries Department in the monitoring and analysis of emerging issues with implications for fisheries and aquaculture at global, regional and national levels. This paper inventories and describes the trends in legal and administrative frameworks, management regimes, and status of marine capture fisheries for thirty-two countries in the Indian Ocean based on the results of a questionnaire; its purpose is to serve as an easy-to-read and informative reference for policy decision-makers, fishery managers and stakeholders.

The editor is indebted to Ms Rebecca Metzner of the FAO Fishery Policy and Planning Division, for sharing her vast experience in fisheries management and for her essential contribution in drafting the questionnaire. Much gratitude is due to the review authors, who faced an enormous task and who showed equally enormous patience with the editor. Ms Indra Gondowarsito and Ms Giovanna Martone were instrumental to the smooth day-to-day operations and the preparation of this document for publication and Ms Tania Abdirizzak and Ms Chrissi Redfern assisted in the formatting for publication. Mr Mathieu Soumy and Ms Elisabetta Martone provided statistical assistance and Mr David Dunn assisted in the editing. Lastly, the editor would like to thank Mr Ulf Wijkström, former Chief of the FAO Fishery Development Planning Service, for providing the initiative and means to complete these reviews.

Abstract

During the first half of the 1990s, in response to the increasing concern about many of the world's fisheries and following the United Nations Conference on Environment and Development (UNCED), a number of international fisheries instruments provided an impetus for countries to strengthen their fisheries management. A key step in supporting such efforts is the development of more detailed, systematic and comparable information on fisheries environments and management trends. *The State of World Marine Capture Fisheries Management Questionnaire* was developed by FAO in 2004 to help meet this need. The result have been grouped by region and reported in this publication. Today, we are able to look back to see how countries responded, to examine whether more fisheries are managed, and to determine whether the management tools and strategies employed have improved the overall situation in marine capture fisheries. Trends in legal and administrative frameworks, management regimes and status of marine capture fisheries are analysed for thirty-two countries in the Indian Ocean and presented as an easy-to-read and informative reference for policy decision-makers, fishery managers and stakeholders.

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Introduction

Poor sustainability in marine capture fisheries has been characterized as stemming from and manifesting itself through “the interaction of many interrelated factors”, including: (i) the absence of guaranteed rights; (ii) the supremacy of short-term socio-economic considerations over long-term ones; (iii) a perverse incentive structure reinforcing and allowing externalization of private costs; (iv) the increased demand from a growing human population and consequent rising prices; (v) poverty and lack of alternatives in many areas; (vi) ineffective governance and weak enforcement; (vii) disturbances such as pollution, climate oscillations, wars; (viii) scientific and administrative uncertainty; and (ix) competition between users, within and between sectors (Garcia and Boncoeur, 2004).

Garcia and Boncoeur followed up with a prescription of corrective actions including: (i) the granting of more effective rights of use; (ii) improved transparency; (iii) more participation in decision-making; (iv) better understanding of the resources and the communities depending on them; (v) a more precautionary approach to management; (vi) more active consideration of the ecosystem interrelationships; (vii) better monitoring and enforcement; (viii) more equitable distribution of benefits; (ix) integrated development and management policies; and (x) a stronger role of consumers.

This review attempts to provide a standardized analysis of marine capture fisheries management in thirty-two Indian Ocean countries¹, with the goal to establishing how far they have come in implementing the corrective actions that constitute, *a priori*, the necessary ingredients towards sustainable fisheries.

As a means to this end, a detailed questionnaire, the *State of World Marine Capture Fisheries Management (SOWMCFM) Questionnaire*, was developed by FAO to assist country review authors to organize information on direct and indirect legislation affecting fisheries, costs and funding of fisheries management, stakeholder involvement in management, transparency and conflict management, and compliance and enforcement into two major components: national fisheries management in general, and tools and trends in the top three fisheries (by volume) in each of the three marine capture fishing sectors (commercial/industrial, small-scale/artisanal/subsistence and recreational).

After completing the questionnaire, each country review author was guided by an annotated outline of the written review, providing a starting point series of questions pertinent to understanding fisheries management. Each country review followed a seven-part outline and attempted to address the following questions:

POLICY FRAMEWORK

- Where are the objectives set forth (national, regional or local legislation)?
- When was the legislation first adopted? Has the legislation been revised? When?
- If the legislation had been revised in the past ten years, were changes made to specifically incorporate recent international fisheries management norms/mandates (FAO Code of Conduct for Responsible Fisheries, United Nations Fish Stocks and the FAO Compliance Agreement, etc.)?

¹ This publication will be followed by similar reviews covering the Atlantic and Pacific Oceans.

- Is there other, non-fishery specific legislation that impacts the overarching objectives of fisheries management (e.g. sustainable development or other social and economic objectives)?

LEGAL FRAMEWORK

- Who is responsible for fisheries management?
- Who is responsible for monitoring and enforcement?
- Is it the same agency for the above items at different jurisdictional levels in the country? If not, how is responsibility divided?
- If there are different agencies responsible for various aspects and/or different jurisdictional levels, are they required to coordinate management measures for the same stocks?
- Is the legal framework or process for fisheries management influenced by non-fisheries specific legislation (e.g. requirements for actions under environmental impact statements, cost benefit analyses, endangered species legislation, marine protected area legislation or designations that affect fisheries but were not adopted for the purpose of fisheries management)? If so, how?

STATUS OF FISHERIES IN THE COUNTRY

- This section provides a brief overview of the fisheries in the country (e.g. the number of exploited stocks, the total value and volume of fisheries, the contribution to the Gross Domestic Product (GDP), the relative proportion of that contribution from the various types of fisheries, the largest fisheries by volume and value in the country).

MANAGEMENT ACTIVITY

- How are management measures developed and implemented? Who is responsible? To what extent are stakeholders involved?
- How many fisheries in the country are managed (approximate or actual)?
- Of the total number of exploited species/stocks, what percentage has some form of management?
- Has the number of managed fisheries changed during the past 5 years? 10 years?
- What events or other factors drove changes in the management actions, measures and/or mechanisms adopted?
- Are stocks regularly assessed to determine their status? If so, how many are overfished, depleted, or fully utilised?
- Are fishery managers legally required to adopt measures to address overfishing and rebuild depleted stocks?
- What management tools are used?
- Have the tools changed over the past ten years? If so, are there any identifiable trends towards or away from the use of various management tools? Why?
- Are there gears or management tools that are prohibited? Why?
- Has the introduction of management measures adopted in the past ten years improved the status of the fisheries/stocks?
- What are the principal impediments to more effective management?

COSTS AND REVENUES OF FISHERIES MANAGEMENT

- How have budgets/costs/revenues changed over the past ten years? Why?

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

- If the country has signed, ratified or acceded to the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Fish Stocks Agreement

(UNFSA) and/or the FAO Compliance Agreement, please describe actions to implement the provisions in domestic fisheries.

- If the country has taken steps to implement recently adopted International Plans of Action relating to capacity management, illegal, unreported and unregulated (IUU) fishing, shark management and/or seabird bycatch in longline fisheries, please describe the actions taken to date.

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBs)

- Briefly describe the extent to which the country participates in regional fishery management organizations.
- Is there an established legal mechanism to implement management measures adopted by regional fishery bodies? If so, is the mechanism regularly followed (e.g. in a timely manner to ensure compliance with measures adopted by the RFBs)?

Each country review was complemented by a series of annexed tables, providing detail on the three major fisheries by volume in each of the commercial/industrial, small-scale/artisanal/subsistence, and recreational sectors.

Generally, undertaking such a process entails considerable constraints. The choice of one author per country created the possibility for time lapses² between the receipt of various reviews and had the potential to generate biased reviews. The difficulties inherent in different management environments stemming from lack of data and transparency, official versus effective management, definitional differences as to what constitutes large-scale or small-scale fisheries, and whether a stock-based or gear-based definition of individual fisheries was applied. Therefore, although cross-country comparisons may provide some insight into different management schemes and their impacts on sustainability, the ensuing subregional and regional reviews did not claim statistical robustness.

One must note that these country reviews are not official government reviews³ but an attempt by one individual to collect as much information as possible through published documents, personal communications with relevant stakeholders, and their own experiences in these fisheries. This approach permitted the author to provide what one hopes to be an honest review of the strengths and weaknesses in the country's fisheries management regime and to provide some guidance on how best to move toward attaining sustainable fisheries.

Subregional reviews were drafted, based on the individual country reviews and following the same schematic described above, while including topics addressing regional management aspects, such as the joint management of shared stocks. A presentation of the combined questionnaire responses is proffered, given the limitations of such an exercise, as a snap-shot of fisheries management in the Indian Ocean during the 2003/2005 period. This initial attempt will provide the baseline for a long-term understanding of how and if, and perhaps why, management regimes are evolving and whether these attempts prove successful in attaining national, regional, and international goals with respect to these fisheries.

It is the hope of the editor that this review provides fisheries managers, policy-makers and stakeholders with a constructive review of their own national marine capture

² Note that the data published in this volume may have been revised and/or updated since the drafting of individual reviews. Therefore, caution in using these data is warranted.

³ However, officials from fisheries ministries/departments were invited to provide comments on the reviews.

fisheries management schemes and a vehicle for learning about others' experiences in managing fisheries in the face of multiple and potentially contradictory objectives.

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Overview – Indian Ocean

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FAO, Fishery Policy and Planning Division
October 2005

INTRODUCTION

The countries of the Indian Ocean¹ are characterized by a considerable diversity of economies, cultures, fishing practices, and fishing management approaches. Therefore, any attempt at cross-country comparisons or regional aggregation of information, without providing detailed explanations at the country level, is doomed to oversimplify the situation and possibly mislead the reader. Added to this are the difficulties inherent in different management environments stemming from lack of data and transparency, discrepancies between the status of management as formally reported and its true and real situation, definitional differences as to what constitutes large-scale or small-scale fisheries, and differences in whether a stock-based or gear-based definition of individual fisheries was applied. Therefore, this overview can be useful only in providing ‘first-glance’ insight into the region’s fisheries management regimes and their impacts on sustainability. For a deeper understanding of the historical, political and economic contexts behind the aggregated data presented in this Chapter, the reader is invited to refer to the regional and country reviews within this report.²

This chapter presents the results of the FAO *State of World Marine Capture Fisheries Management* (SOWMCFM) *Questionnaire* from thirty³ Indian Ocean countries, completed during the end-2003 to beginning-2005 period. First, national-level aspects⁴ of fisheries management are presented including related legislations, the costs and funding of fisheries management, stakeholder involvement and conflict management, and compliance and enforcement. The chapter then looks more specifically at the trends in the use of management tools within the top three (by volume) marine capture fisheries within the large-scale, small-scale, and recreational fisheries subsectors.⁵ In addition, a brief summary of existing knowledge of Indian Ocean stocks is presented.

The information provided in the questionnaires are not official government responses but an attempt by each respondent to collect as much information as possible through published documents, personal communications with relevant stakeholders, and their own experiences in these fisheries. This approach permitted the country review author to provide information on the fisheries even where no official information existed.

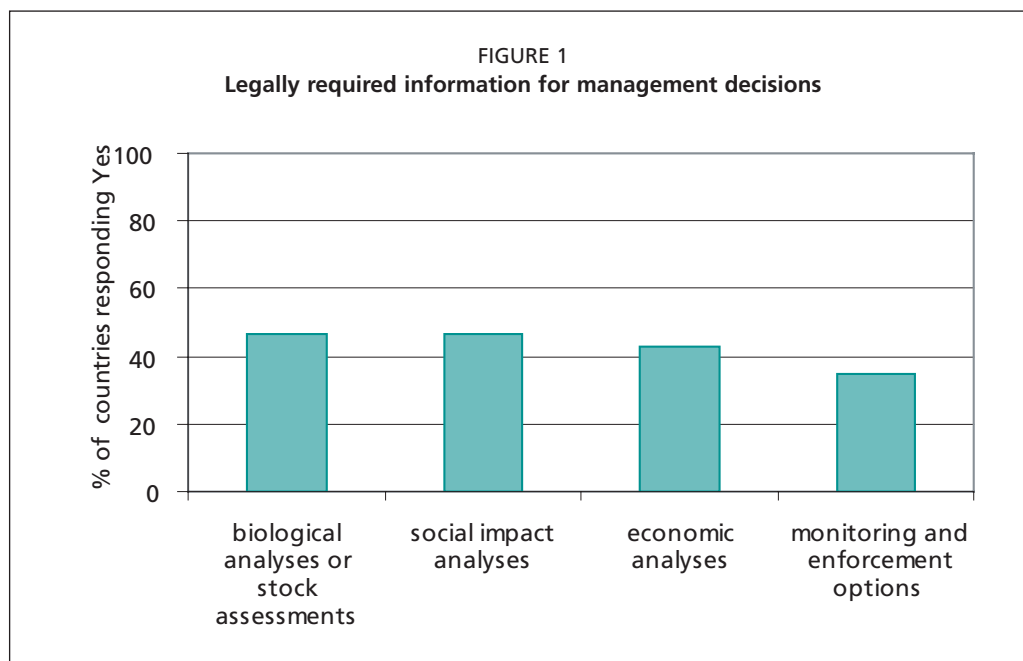
¹ Including the Red Sea and Persian Gulf.

² Additional resources for the reader are the chapters concerning the Indian Ocean fisheries resources within the Review of the state of world marine fishery resources (FAO, 2005).

³ Questionnaire were received from Australia (west coast), Bahrain, Bangladesh, Comoros, Djibouti, Egypt (Red Sea coast), Eritrea, India (east coast), India (west coast), Indonesia (Pacific and Indian coasts), Iran, Iraq, Jordan, Kenya, Kuwait, Madagascar, Malaysia (Pacific and Indian coasts), Maldives, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Qatar, Saudi, Arabia, Seychelles, South Africa (east coast), Sri Lanka, Sudan, United Republic of Tanzania, Thailand (Indian Ocean coast), UAE and Yemen. Questionnaires were not received for the Seychelles, Somalia, and Tanzania.

⁴ Includes inland and marine capture fisheries.

⁵ Also referred to as commercial/industrial, artisanal/lifestyle/subsistence/indigenous/customary fisheries, and recreational/sports fishing including non-consumptive uses, respectively.



NATIONAL MARINE FISHERIES FRAMEWORKS

In accordance with the principles of international law, as reflected in the relevant provisions of the 1982 United Nations Convention on the Law of the Seas (UNCLOS),⁶ the countries of the region are responsible for regulating access to fisheries resources within their economic exclusive zone (EEZ) and “to ensure, through proper conservation and management measures, that the maintenance of these living resources are not endangered by over-exploitation”.

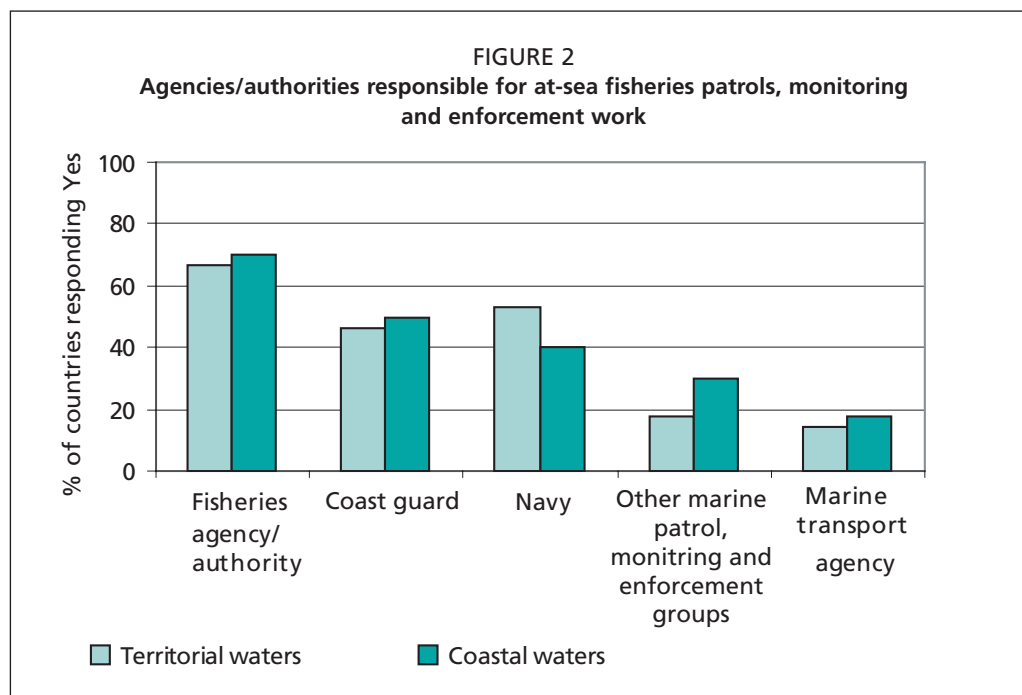
Legislative and political frameworks

All countries within the region had specific legislation for the management of marine capture fisheries and almost all such legislation provided a fisheries management legal framework (93 percent of countries evaluated), but slightly fewer provided an administrative framework for such management (87 percent). However, the term ‘fisheries management’ was defined in only 24 percent of those countries responding and only 57 percent of the countries had laws and regulations designed to serve as a legal framework for fisheries management and fisheries management plans. In addition, only in a minority of cases did national legislations require that fisheries management decisions be based on at least one of the following analyses: biological analyses/stock assessments, social impacts analyses, economic analyses, or monitoring and enforcement analyses. Therefore, there was relatively little legal guidance on the processes for taking management measures and, hence, fisheries managers were often missing the inter-disciplinary information required to develop proper management measures.⁷

In addition, participatory processes within fisheries management were formally practiced within 47 percent of the countries and, in most cases, this participation was limited to consultative management, where fisheries management stakeholders were consulted, but did not share management responsibility. Less infrequently were co-management structures, in which stakeholders share a large part of management responsibility.

⁶ Most countries of the region are either signatories of or Parties to the Convention. Exceptions include Eritrea and Jordan. See <http://www.un.org/Depts/los/index.htm>.

⁷ On these requirements, see Evans and Grainger, 2002.



The legislation in most countries (90 percent) identified a single agency or other authority⁸ with the responsibility for marine capture fisheries management at the national level⁹; however, these agencies/authorities either legally shared management responsibilities with other agencies (48 percent) and/or were further assisted by government or quasi-government agencies for their fisheries research (70 percent), to be further supported by universities. In many cases (70 percent), the fisheries agencies/authorities were also supported by at least one other agency (e.g. navy or coast guard) for the monitoring and control of fisheries laws (Figure 2).

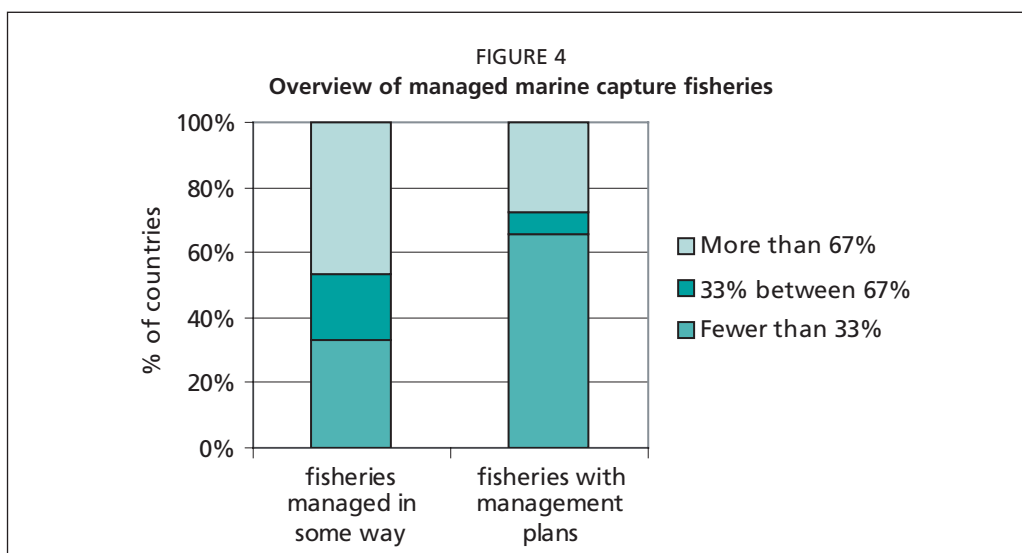
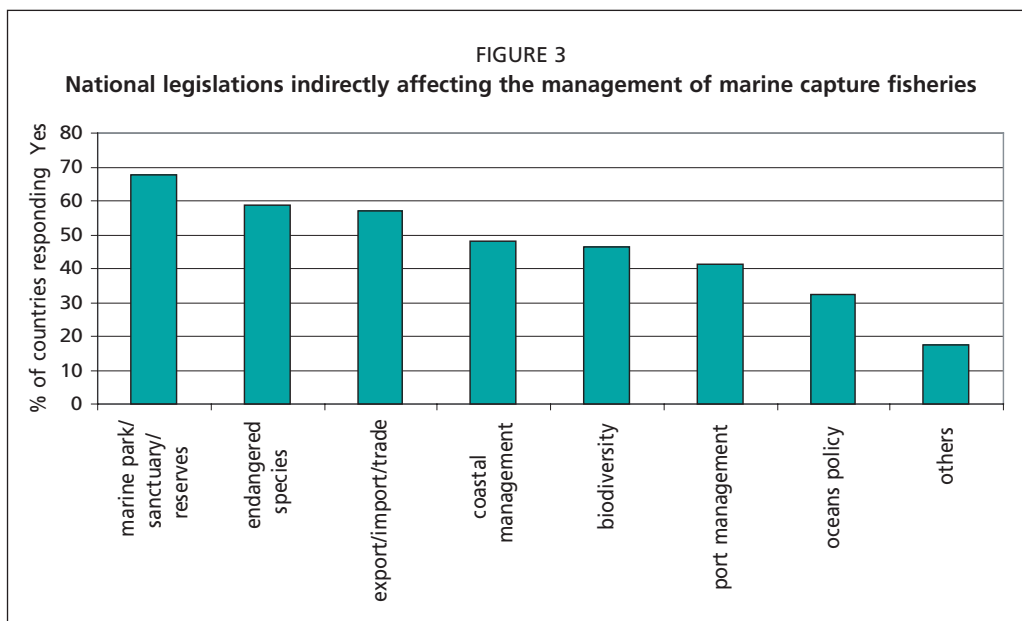
The policy framework in place within the region was more often than not development orientated, despite many fish stocks being considered at least fully exploited (FAO, 2005). When specific fisheries management objectives were provided for in the legislation (43 percent), the objectives tended to be split into either development-oriented or sustainability-oriented lines. Countries in the Red Sea and Arabian Gulf tended to have development-oriented objectives, those countries along the eastern rim of the Indian Ocean tended to specify sustainability criteria within the legislation; while those along the western rim tended not to have specific management objectives within their legislations (South Africa and Madagascar excluded). However, most countries fisheries management were affected by at least one other national legislation based on sustainability concepts (Figure 3).

In only approximately 50 percent of the countries were more than 67 percent of the marine capture fisheries considered “managed in some way”¹⁰ and, for those fisheries considered managed, the fisheries were more likely to be lacking any formal documented management plans (Figure 4). However, the perception within the

⁸ Occasionally as a stand-alone authority or Fisheries Ministry but more often in the form of a Fisheries Department within an Agriculture/Livestock or Environment Ministry or a combined Agriculture/Fisheries Ministry.

⁹ Note that formal designation of a single agency or other authority responsible for fisheries management at the regional level within country or at the local level was less common: 48 percent and 37 percent, respectively.

¹⁰ According to the questionnaires, the concept of ‘managed’ was mostly inferred to mean 1) published regulations or rules for specific fisheries, 2) legislation about individual fisheries, and 3) interventions/actions to support specific management objectives.



countries is that the number of fisheries managed in some way has increased over the past ten years.

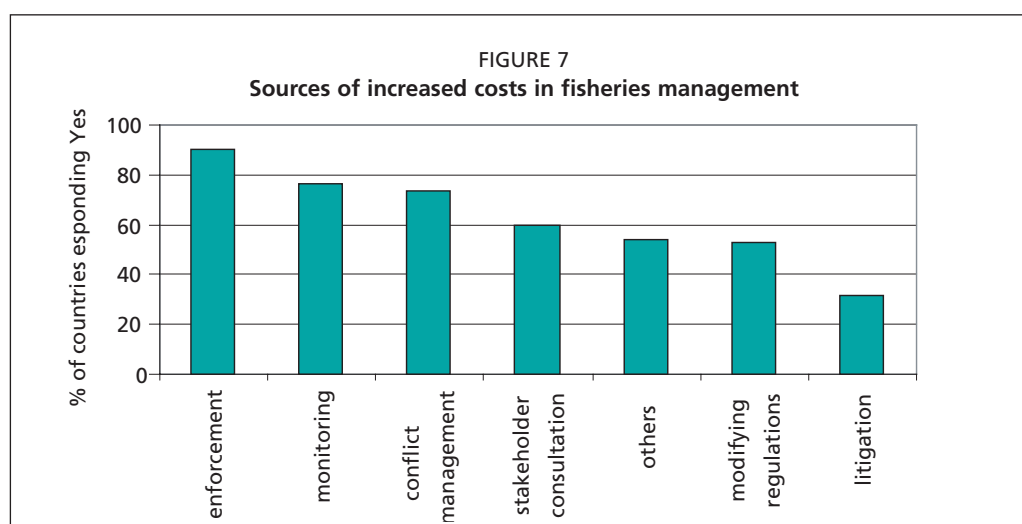
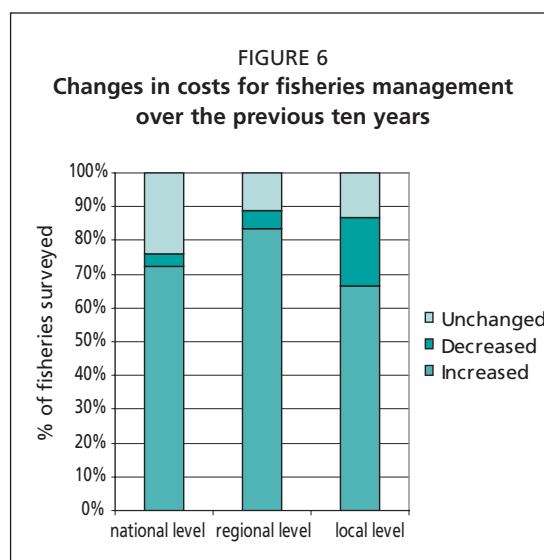
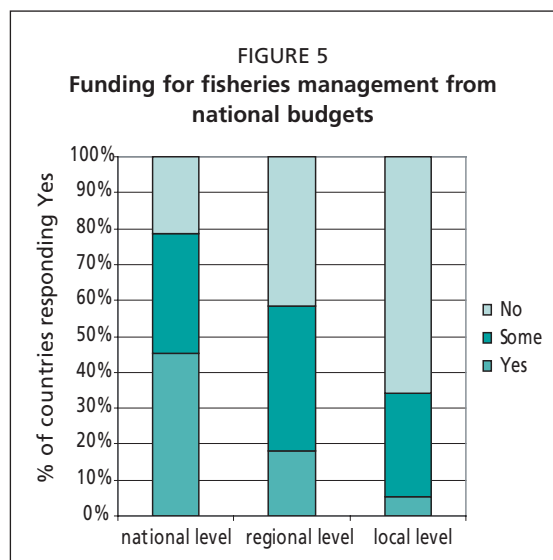
Costs and funding of fisheries management

Budget outlays for fisheries management included, *inter alia*, funding for research and development, monitoring and enforcement, and daily administrative management. Only in approximately ten percent of the countries were these activities not covered in some way by national government funding.

In most countries (90 percent), the costs of fisheries management were provided at least in part by national government funding; however, national funding sources tended to decrease as management moved toward regional and local levels (Figure 5). This trend was in contrast to the increased costs related to fisheries management at these levels (Figure 6), due in part to decentralization policies throughout the region.

Compliance and enforcement

In most cases, the above-mentioned increases in management costs were associated with increased monitoring and enforcement activities but were also due to increased



conflict management and stakeholder consultations (Figure 7). Linked to increased monitoring and enforcement is the perception that, over the last ten years, the numbers of infractions has increased in many countries (67 percent).

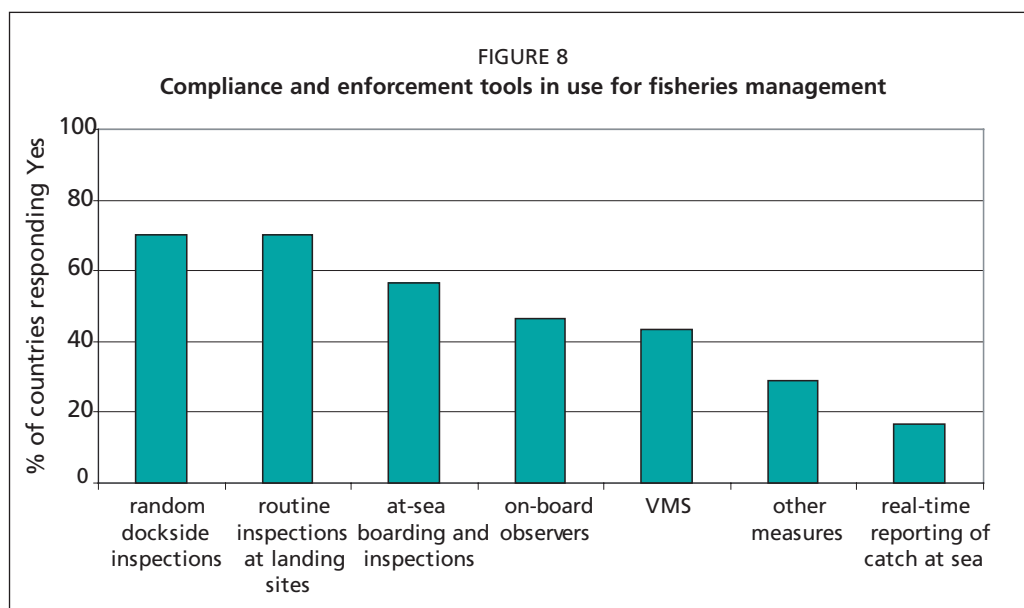
Compliance and enforcement tools within the region focused on inspections, whether on-land or at-sea. The use of additional tools, such as on-board observers or vessel monitoring systems (VMS) was less widespread within the region (Figure 8).

When faced with infractions, most countries relied on small fines or the revocation of fishing licences as deterrents; however, the perception within the vast majority of the region's countries is that 1) the funding provided is not sufficient to enforce all fisheries regulations, 2) the penalties for non-compliance are not severe or high enough to act as deterrents, and 3) the risk of detection is too low to promote adherence with fisheries regulations.

REVIEW OF FISHERIES MANAGEMENT TOOLS IN USE WITHIN THE LARGEST MARINE CAPTURE FISHERIES

Within the 30 countries surveyed, 55 large-scale, 61 small-scale, and 18 recreational fisheries were identified as the top three largest fisheries by volume in each subsector (Appendix 1).¹¹ As the definitions for each subsector as well as whether a fishery was

¹¹ For those countries bordering multiple oceans, only Indian Ocean fisheries are included. However, the information for Indonesia and Malaysia includes data from both Pacific and Indian Ocean fisheries.



defined by gear or by species were left open to allow for relative definitions within each country, the resulting data should be interpreted loosely. However, the resulting trends have been grouped by subsector as they reflect common management issues across the countries and provide up-dated data at levels which are usually not collected within national and international data collection systems. Fisheries analysed within the questionnaires were limited to national fisheries within continental and jurisdictional waters; they exclude high-seas fishing and foreign fishing in exclusive economic zones (EEZ) under access agreements.

Basic data

When matched up with global comparisons of large-scale versus small-scale fisheries (e.g. Thomson, 1980; Berkes *et al.*, 2001; Hart and Reynolds, 2002), the relative sizes between the subsectors remained basically stable (Table 1). The small-scale fisheries involved over 2.5 times more participants (employed part-time or full-time or as subsistence) than the large-scale fisheries and total landings from the two subsectors were approximately equal in size.

The number of participants had increased over the previous ten-year period in most fisheries across the three subsectors (60, 66, and 77 percent of the fisheries, respectively) and had decreased in a smaller number of fisheries (34, 12, and 5 percent, respectively).

Directional changes over the previous five years in landings from the large-scale fisheries varied across the countries (Figure 9). Seven countries reported decreased trends in landings volumes; while eleven countries reported decreased trends in landing values. It is interesting to note that in six of these countries, trends in volumes and values moved

TABLE 1
Basic data on the largest Indian Ocean fisheries by subsector

	Large-scale	Small-scale	Recreational
Number of participants	1.6 million	4.3 million	90 000 ¹
Total landings (tonnes)	4 million	4.2 million	n.a.
Number of vessels	73 000	313 000	n.a.

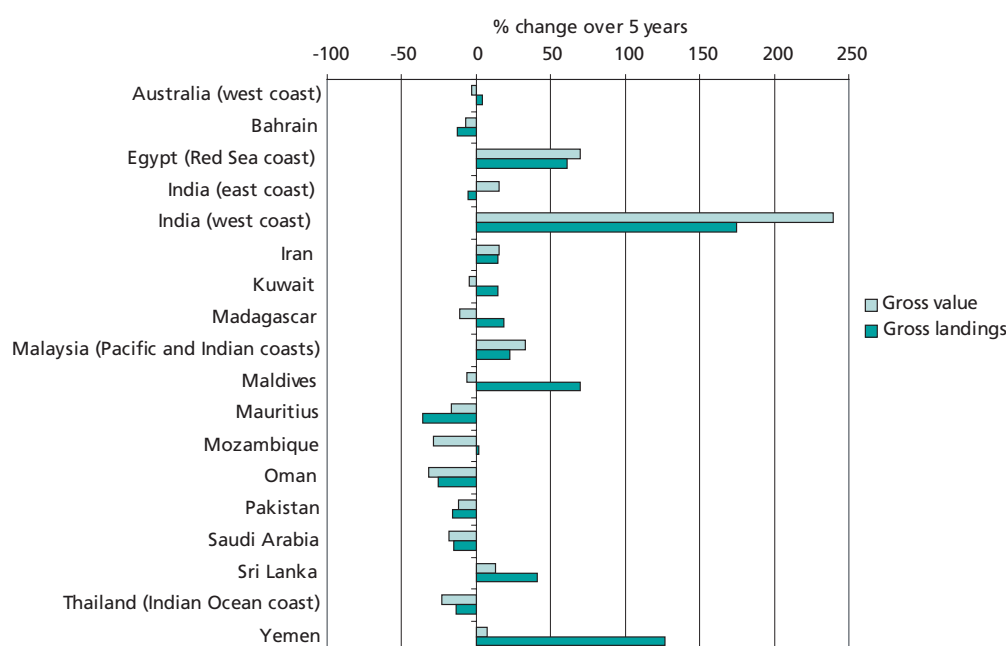
Notes: n.a. = not available.

Data are for the top three (by volume) fisheries for each subsector within 30 Indian Ocean countries.

Indonesia and Malaysia include data from both Pacific and Indian Ocean fisheries.

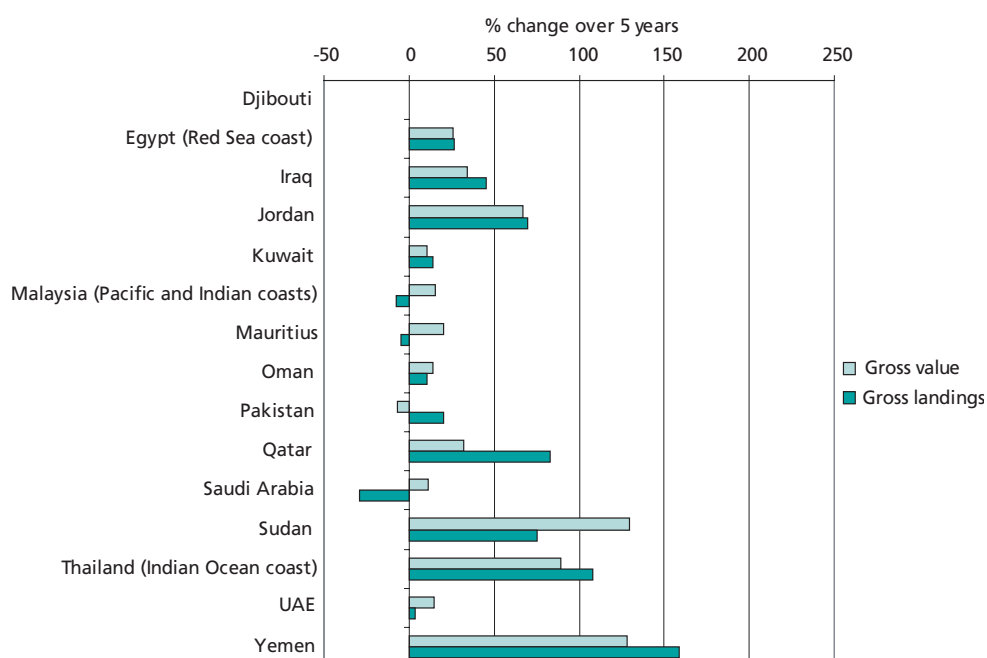
1. Includes only 11 out of 18 fisheries identified due to lack of available data in the recreational fisheries.

FIGURE 9
5-year percentage change in landings and value – top three large-scale fisheries



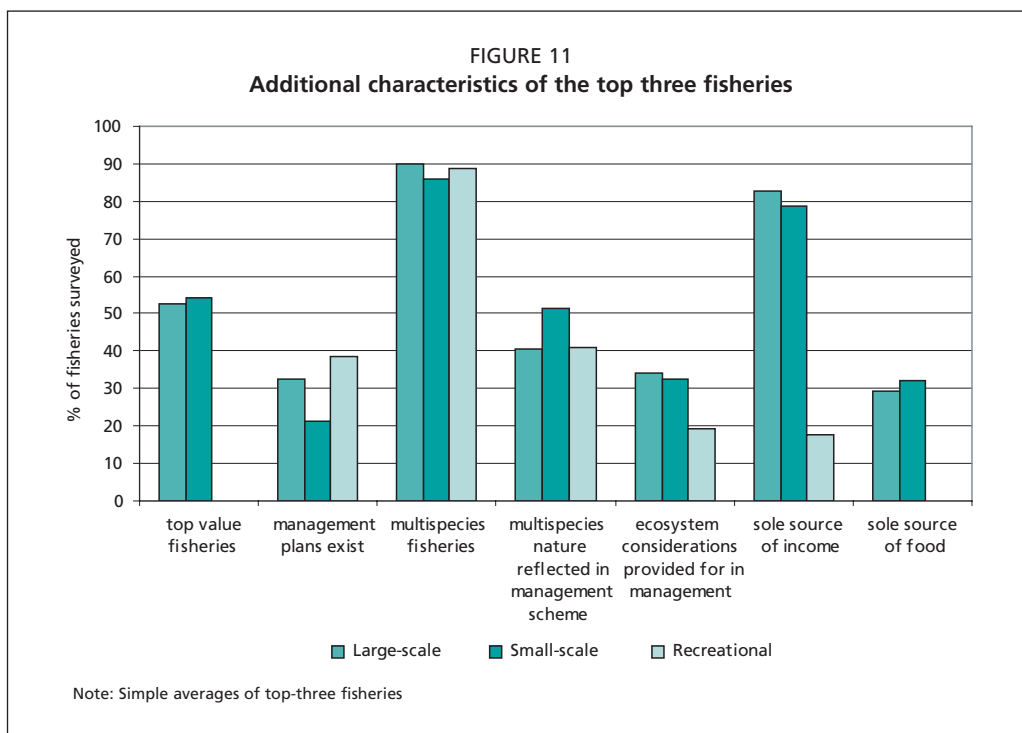
Notes: Indian fisheries include both small- and large-scale fisheries.
 Weighted average of three largest large-scale fisheries within each country.

FIGURE 10
5-year percent change in landings and value – top three small-scale fisheries



Note: Weighted average of three largest small-scale fisheries within each country.

in opposite directions over the five-year period. Most countries reported positive trends in both landings volumes and values within the small-scale sector and, when volumes and values went in opposite directions, volumes decreased while values increased (Figure 10). Changes in quality or price variations may explain this phenomenon.



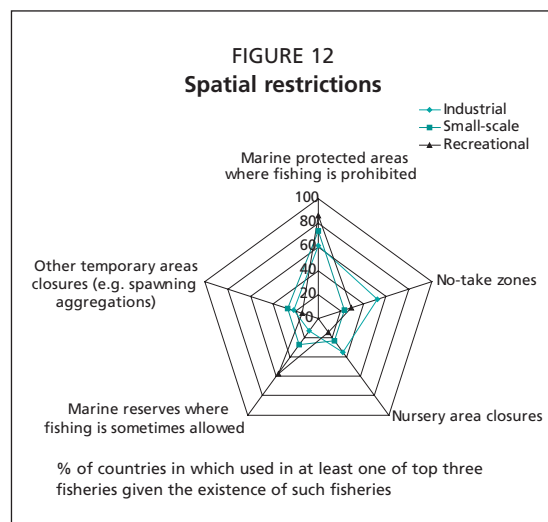
Although the fisheries were the largest fisheries in terms of volumes landed, these fisheries were the highest valued fisheries in only approximately 50 percent of the countries and in no case was recreational fisheries documented as a high value fisheries (Figure 11). Other trends were similar across the subsectors: fisheries-specific management plans were uncommon; most fisheries were multi-species but this aspect was not always accounted for within the management schemes; and explicit inclusion of ecosystem considerations was only occasionally made. In addition, although large-scale and small-scale fisheries activities provided the sole source of income in approximately 80 percent of the countries, fish and fish products provided the staple food source in 29 and 32 percent of the large-scale and small-scale fisheries, respectively.

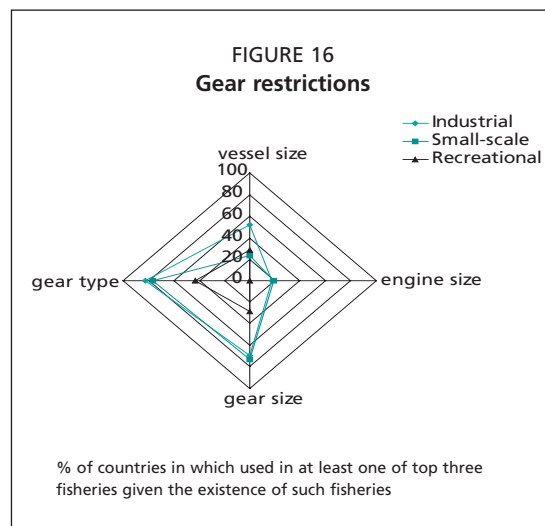
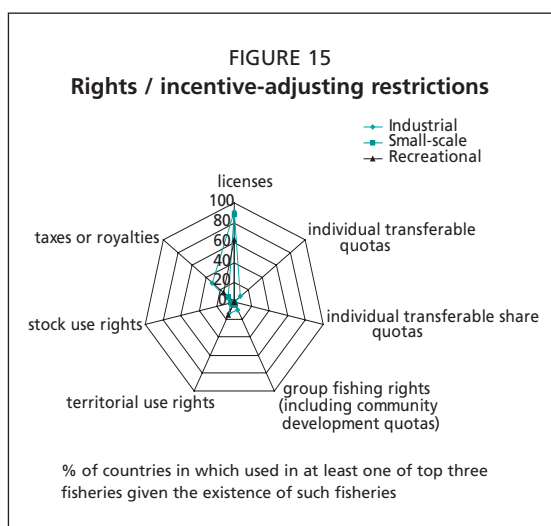
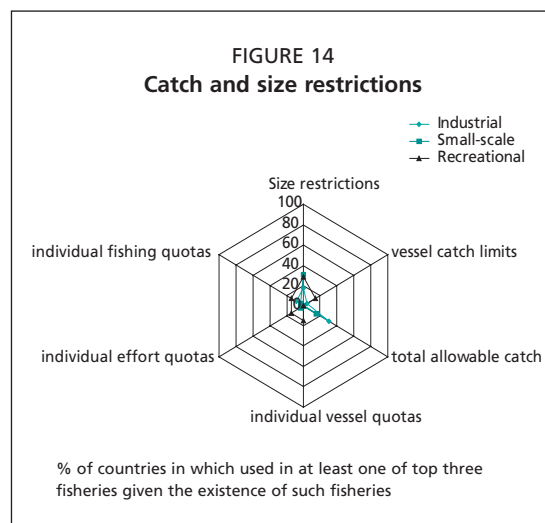
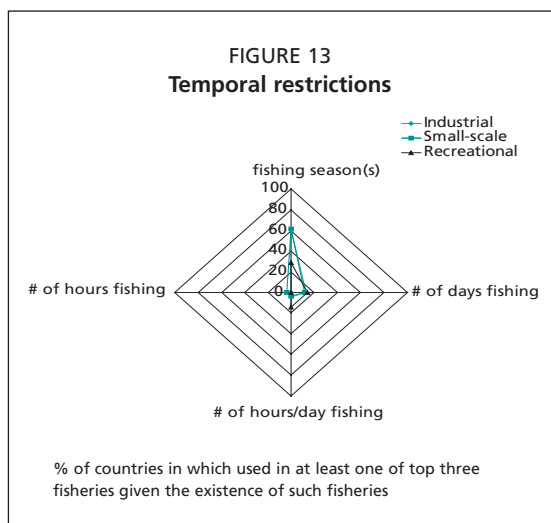
Management tools in use within the largest fisheries

The toolkit of technical measures for fisheries management may be split into five groupings: 1) spatial restrictions, 2) temporal restrictions, 3) catch and size restrictions, 4) rights / incentive-adjusting restrictions, and 5) gear restrictions (Figures 12 – 16).

The results of the questionnaire bring to light certain tendencies within the Indian Ocean countries:

- countries preferred the use of spatial (esp. marine protected areas and marine reserves) and gear restrictions (esp. type and size) over other technical measures for managing marine capture fisheries;
- other than the issuance of fishing licences, very few incentive adjusting or rights providing mechanisms were used;
- tools currently in use within the small-scale sector were, for the





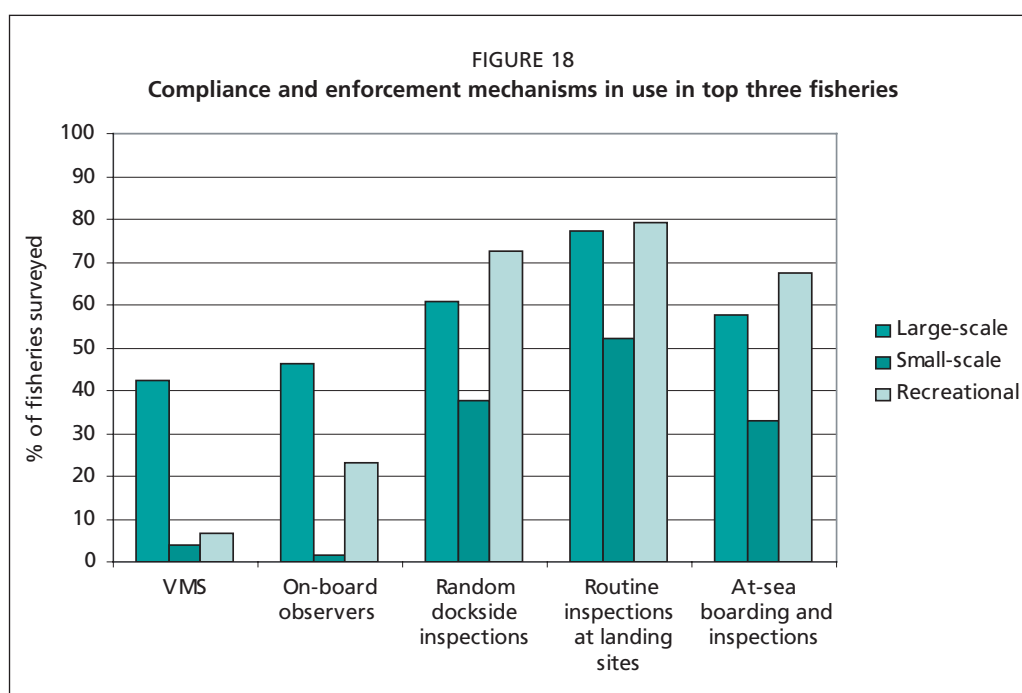
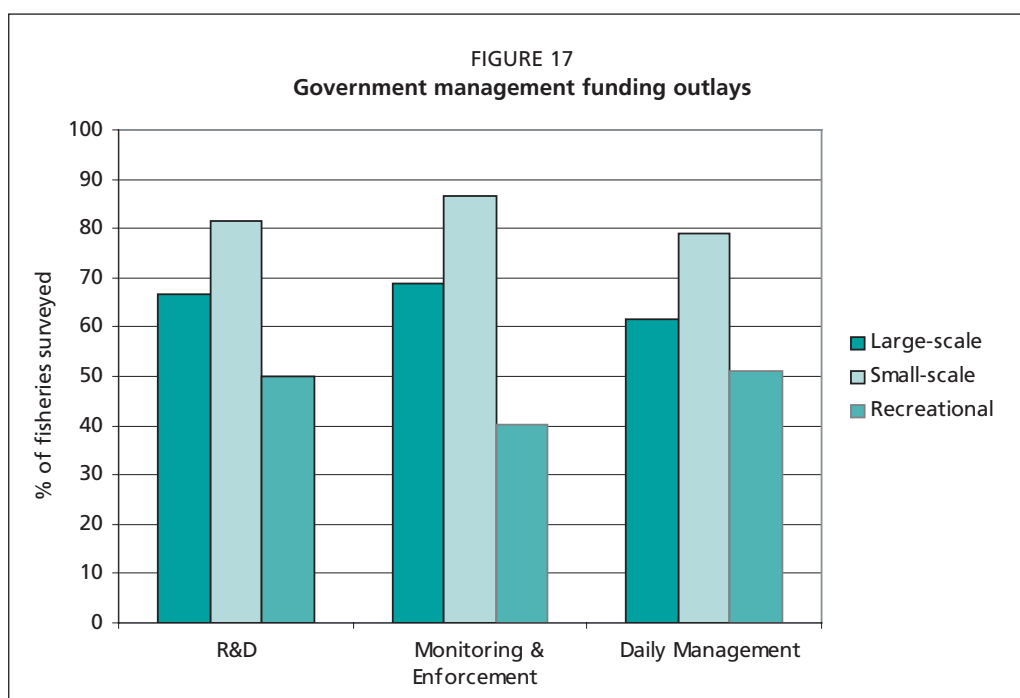
most part, established or increased within the last ten years; while those tools in use within the large-scale and recreational fisheries have not experienced many changes in use patterns with the exception of increased use in spatial restrictions; and

- although recreational fisheries were active in at least ten countries in the region, few management measures are applied to these fisheries other than the establishment of marine protected areas and reserves and, less frequently, the granting of licences and the adoption of gear type restrictions.

Funding outlays and cost-recovery in fisheries management within the largest fisheries

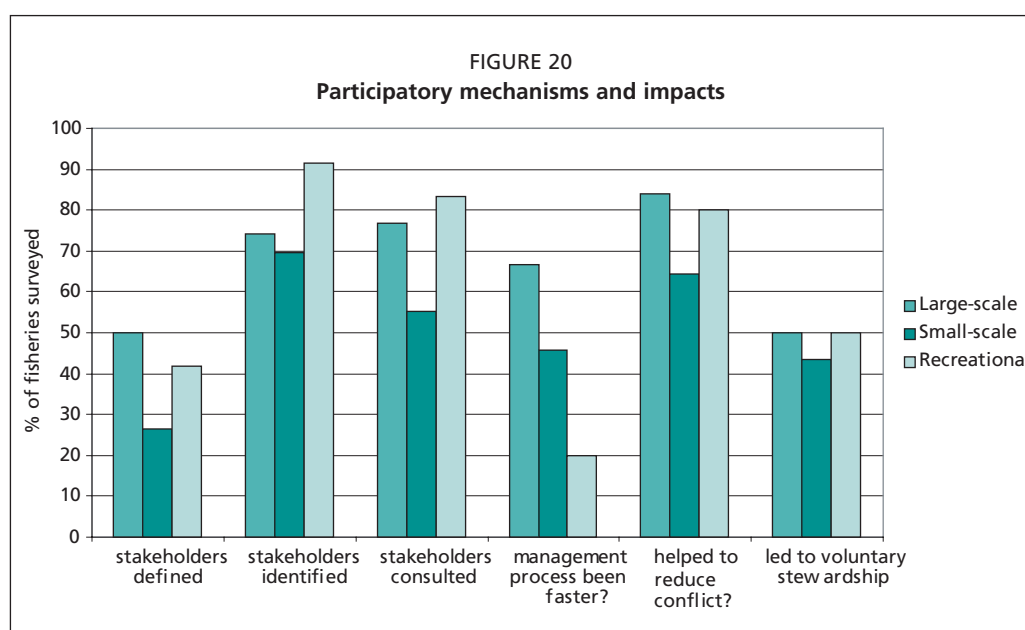
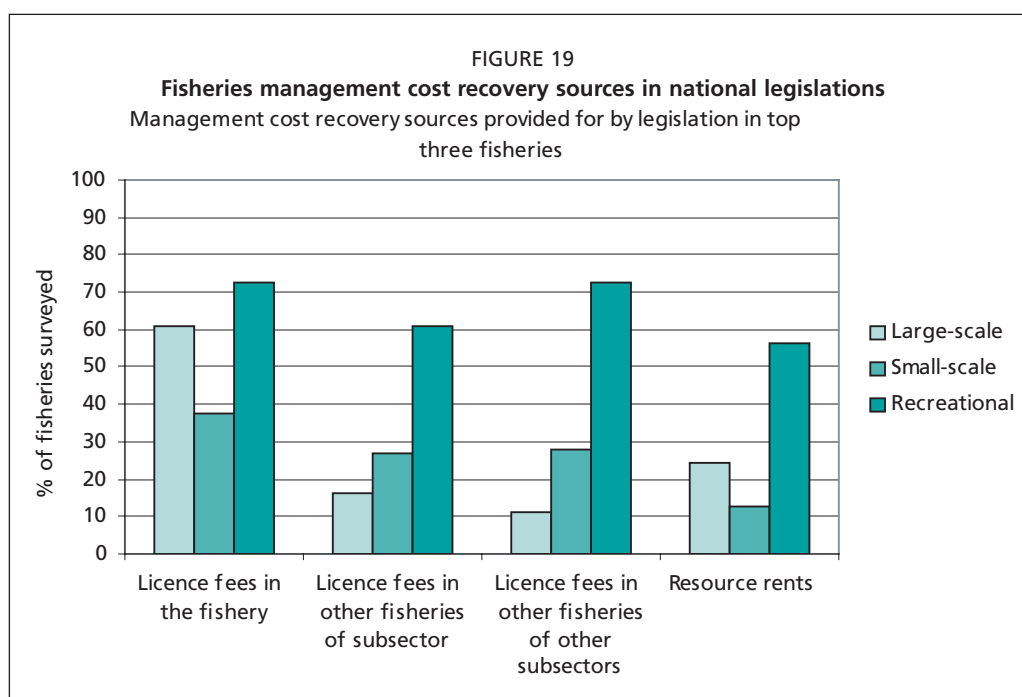
Government funding outlays within the top three fisheries included, *inter alia*, research and development, monitoring and enforcement, and daily management. Coverage among the subsectors tended to focus on the small-scale and large-scale fisheries (Figure 17).

Monitoring and enforcement budgets reportedly increased in at least 50 percent of the fisheries throughout the three subsectors; however, budgets decreased within a third of the large-scale fisheries. Wide-spread use of various monitoring and enforcement mechanisms was reported throughout the large-scale fisheries; contrasted with a dependence on inspections, when used at all (maximum of 52 percent of fisheries), within the small-scale fisheries (Figure 18). For those recreational fisheries identified, the use of inspections appeared to be common in these countries. This reported lack



of monitoring and enforcement within the small-scale subsector raises the question of the effectiveness of management tools and regulations reported above. The limited use (between 40 and 50 percent) of VMS and on-board observers within the large-scale sector also points to weak links within fisheries management for these fisheries.

Fisheries management cost recovery mechanisms (Figure 19), other than licence fees, were uncommon within the large-scale and small-scale fisheries legislations. Interestingly, the use of licence fees and other resource rent recovery schemes were common within recreational fisheries legislations. This difference between the subsectors may reflect whether access to the resources is assumed as a right or as a privilege.

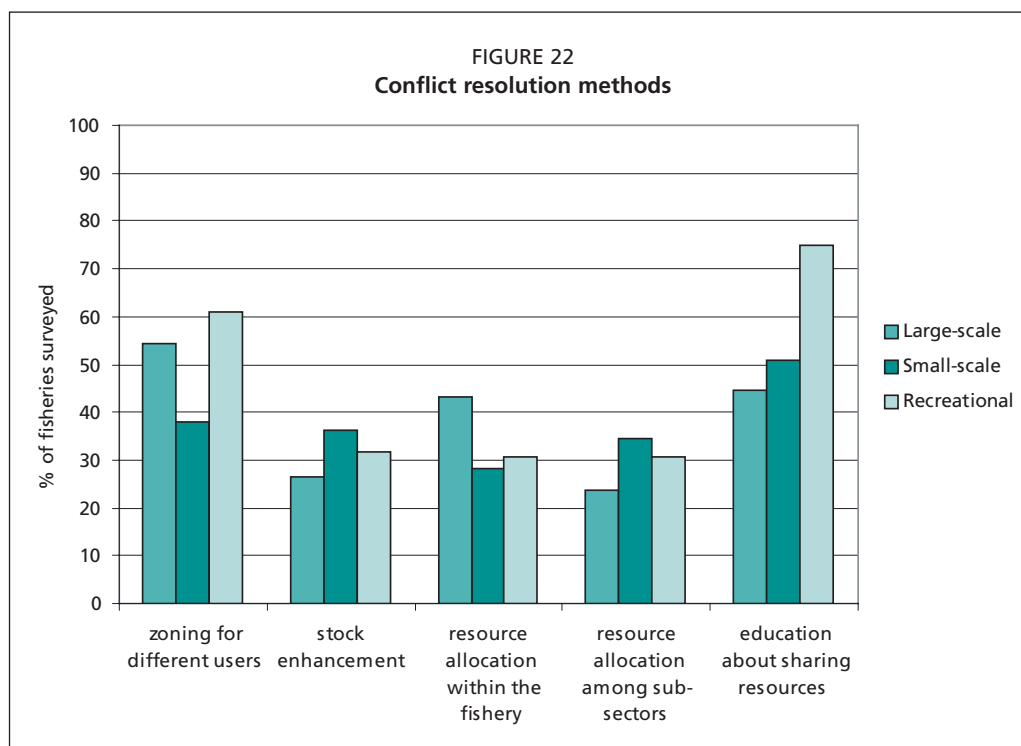
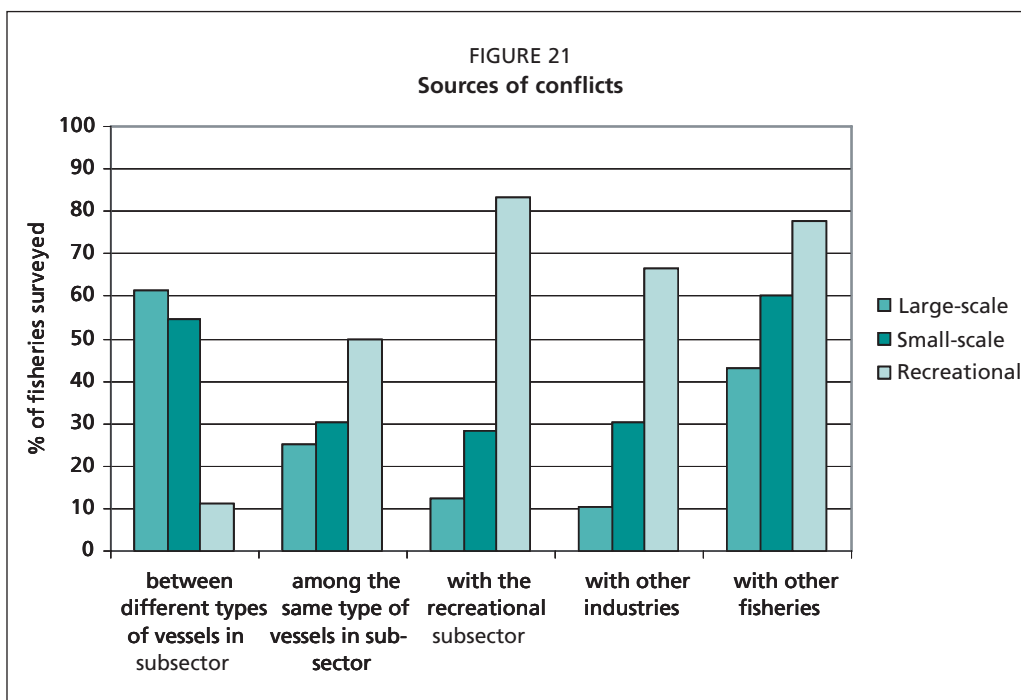


Participatory mechanisms and conflict management within the largest fisheries

Including stakeholders into the fisheries management process is a basic tenet of the FAO Code of Conduct for Responsible Fisheries in part to reflect multiple objectives, roles and responsibilities within each fishery and to foster compliance with any agreed upon management measures.

Although legal or formal definitions of those having an interest in the use and management of fisheries resources were not common, efforts had been made in most fisheries across the three subsectors to identify such stakeholders (Figure 20). In many cases, it was felt that arrangements had been made to consult these stakeholders and to work with them on the management of these fisheries; however, these sentiments were less strong within the small-scale subsector.

If stakeholders were part of the fisheries management decision-making process, the management process had often been sped up within the large-scale subsector but not



necessarily within the small-scale sector and rarely within the recreational subsector. However, the participatory approach had led to a reduction in conflict within the fisheries and, in half of the fisheries, created incentives and reasons for stakeholders to voluntarily practice “responsible” fisheries stewardship.

Although participatory approaches to management assisted in the reduction of conflict within and among the fisheries, there remained significant levels of conflict throughout the subsectors (69, 71, and 64 percent of the fisheries, respectively). Conflict within the large- and small-scale sectors was often caused by competition between different vessels categories or with other fisheries; while conflict within the

recreational subsector tended to arise from competition with all other uses for the same area of water (Figure 21).

Conflict resolution processes were used on average within a third of the fisheries and included zoning for specific users, stock enhancement, resource allocation between and among the fisheries, and educational methods to sensitize users regarding the multiple-use nature of certain resources. There was little variation among the subsectors except that sensitization methods were more common in the recreational subsector than elsewhere.

Fleet capacity management within the largest fisheries

It is commonly accepted that excessive fishing capacity contributes to overfishing, the degradation of marine fisheries resources, the decline of food production potential, and significant economic waste. Therefore, as part of the implementation of the Code of Conduct, countries have been urged to implement the International Plan of Action (IPOA) for the Management of Fishing Capacity (FAO, 1999). The first step in managing fishing capacity is to establish the current level of fishing activity within fisheries and to analyse each fishery for signs of excessive fishing inputs and overcapitalization. The second step would entail the preparation and implementation of national plans to effectively manage fishing capacity and to establish immediate actions for fisheries requiring urgent measures.

Within the Indian Ocean, fleet capacity was indeed measured in the majority of large-scale and recreational fisheries (Figure 23); however, capacity measurement within the small-scale subsector was often not undertaken. In addition, although there was often a “sense” that overcapacity existed within almost half of the fisheries, very few capacity reduction programmes were put into place to adjust for the levels of effort.

When put into place, the method of preference for reducing capacity levels was the purchase of fishing licences from the fishery followed by a less-used approach of buying out fishing vessels licensed to operate in the fisheries. It was felt that licence removal was an efficient means in immediately reducing any excess fishing capacity; while vessel buyouts were considered much less effective. In addition, these initial licence removals, when supported by ongoing licence purchases were often felt effective for ensuring that any excess fishing capacity did not return.

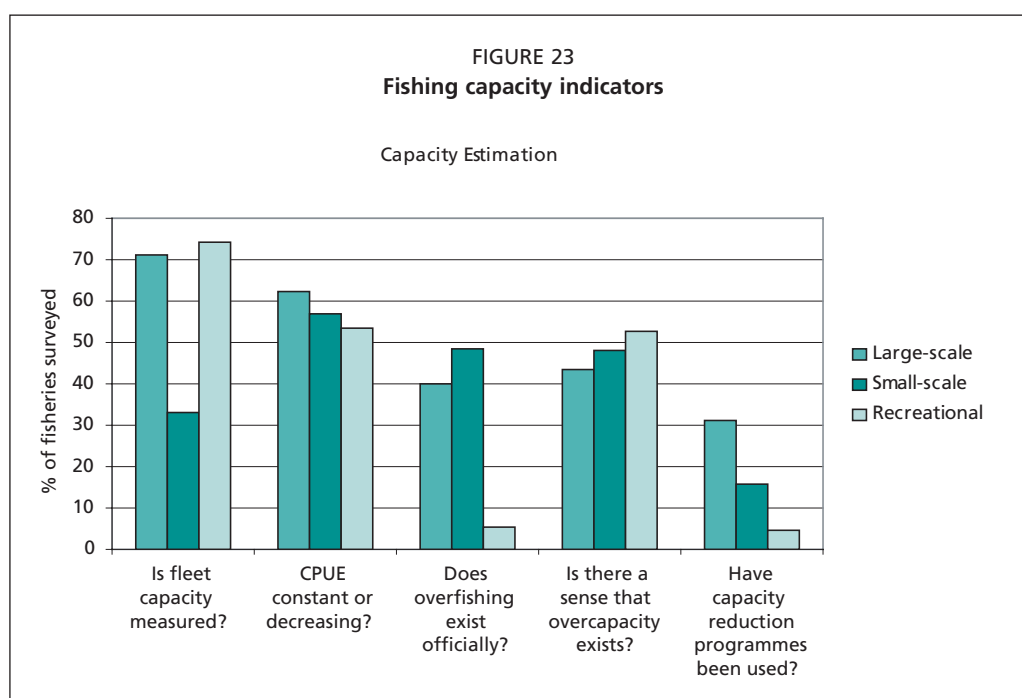
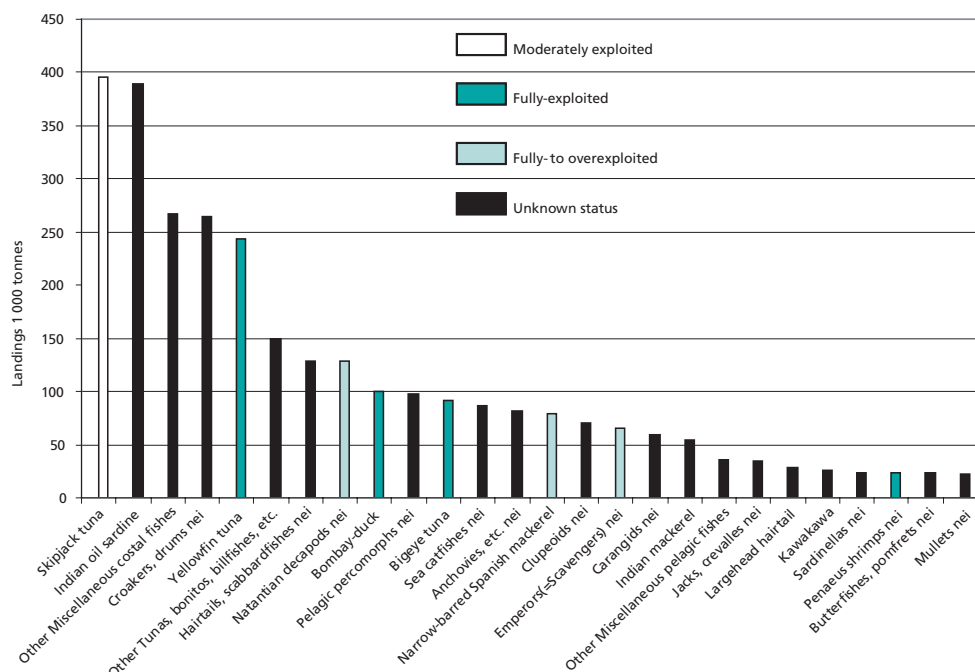
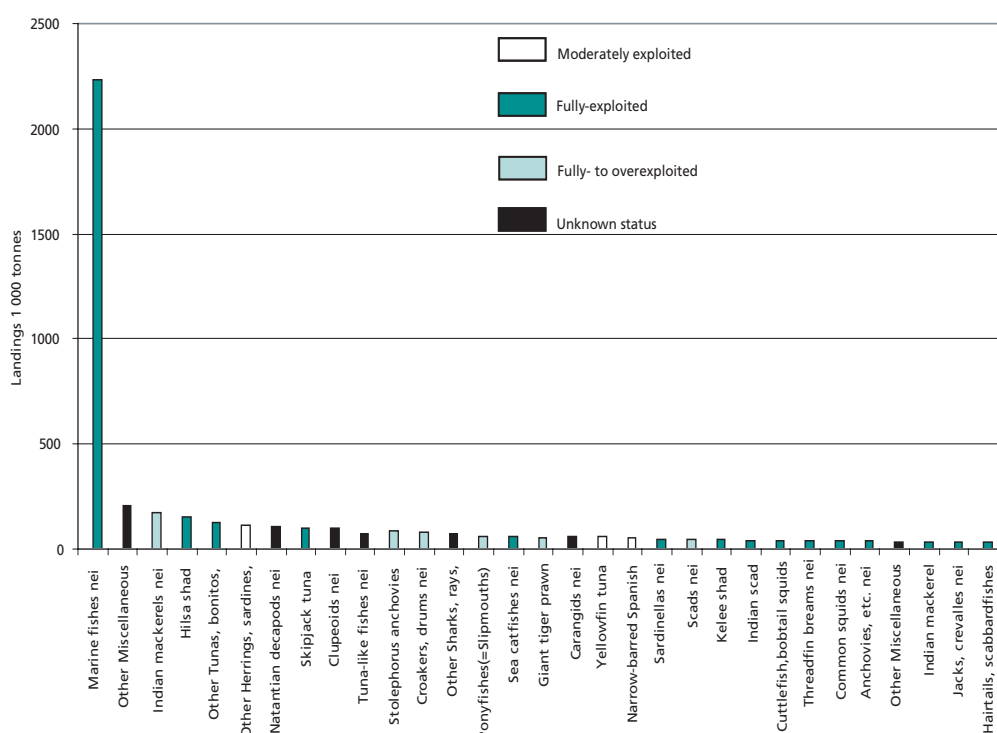


FIGURE 24
2002 Landings and stock status of 30 species landed in the Western Indian Ocean



Source: FAO, 2005

FIGURE 25
2002 Landings and stock status of 30 species landed in the Eastern Indian Ocean



Source: FAO, 2005

Funding for such capacity reduction programmes were generally supported through government funds but several instances occurred in which such programmes were paid for by participants within the fishery itself or, occasionally, by participants within other fisheries.

STATUS OF STOCKS IN THE INDIAN OCEAN

In 2005, the FAO published the Review of the State of World Marine Fishery Resources based on stock assessments and other complementary information available through 2004 (FAO, 2005). For the 47 stocks or species groups of the Indian Ocean for which there was adequate information to evaluate the state of the resources, 41 were determined to fall with the range of moderate-full exploited to full-overexploited (Appendix 2).¹² These levels signal little room for further expansion, in addition to the possibility that some, if not most, stocks might already be overexploited. One should also note the number of stocks for which it has not been possible to determine stock status.

It should also be noted that, within the sub-regional reviews included in this report, authors estimated more serious conditions for certain species than was portrayed at the larger statistical area used in the FAO report. This points to further need for precaution within the Indian Ocean, especially when the effects of illegal, illicit, and unreported (IUU) fishing on the stocks are difficult to ascertain and control.

SUMMARY AND CONCLUSIONS

The challenges regarding fisheries exploitation and management in the Indian Ocean countries are not uncommon to those in other regions:

- Legislative reforms have improved the regulatory framework but application of such reforms has remained limited and lack of effective monitoring, control and surveillance (MCS) has undermined fisheries management.
- Fisheries policies often remain development-driven and without consideration to economic, social, biological, and environmental sustainability criteria; however, examples of holistic management approaches exist within the region and experiences in these could prove useful for the region.
- Conflicts between and among fisheries remain pervasive.
- The number of small-scale vessels and fishers is high and, combined with the potential role of small-scale fisheries in poverty alleviation and prevention, management of these fisheries remains difficult to develop and implement.
- Reliance on classical and costly stock assessment have limited the ability of countries to gather consistent stock data. Combined with the need for ‘hard’ data, fisheries planning capacities are often stalled at the status quo even whilst the qualitative data suggest that many stocks are fully- or over-exploited.
- Socio-economic data are infrequently collected or not at all; therefore, the contribution of small-scale fisheries to human well-being, food security, and poverty alleviation and prevention is poorly understood and the impacts of potential management measures can not be evaluated throughout the three subsectors.
- Information on shared and transboundary stocks is often missing or inadequate and relevant institutions arrangements are often missing.
- Integration of stakeholders in the fisheries management process has increased but remained limited; leading to continued difficulties in managing fishing capacity within all subsectors but specifically within the small-scale subsector.

¹² Moderately exploited – exploited with a low level of fishing effort; believed to have some limited potential for expansion in total production. Fully exploited – operating at or close to an optimal yield level with no expected room for further expansion. Overexploited – exploited at above a level which is believed to be sustainable in the long term, with no potential room for further expansion and a higher risks of stock depletion/collapse.

- The multispecies nature of most fisheries has not been taken into consideration.
- Clearly defined priorities of objectives for each fishery are lacking, which leads therefore to inappropriate planning and increased conflicts within and among the fisheries.

Actions to address these issues may include:

- The introduction of adaptive and cost effective management strategies, based on strengthened management structures with well-defined, prioritized objectives;
- The strengthening of the ecosystem approach to fisheries management;
- The investigation of cost-effective data gathering methods for biological, economic, social, and environmental aspects of fisheries;
- An effective enforcement of fishery laws and regulations;
- A better control over growth in fishing fleet capacity;
- A greater harmonization of the definition and application of laws and regulations, where appropriate;
- The development of fisheries management plans with relevant stakeholders;
- The development of national plans of action to address IUU and capacity issues;
- An active participation in regional initiatives such as regional fishery bodies to assist in the control of IUU fishing, the harmonization of fisheries laws and regulations, and of the development of consistent management measures with respect to shared and transboundary stocks, and
- A greater involvement of stakeholders in management with consideration given to co-management schemes, especially at the local level, requiring the creation or strengthening of organizations to represent fishers and other interests.

The countries of the Indian Ocean will need to continue in their development of sustainable fisheries management frameworks; addressing both international norms and agreements as well as adapting to each country's specific situation and needs. Although there is no panacea for managing all fisheries, countries could benefit from the experiences of other countries in the same region, as well as elsewhere, and existing literature in the search for creative and cost-effective methods for managing fisheries.

In addition, regardless of the management framework chosen, if there is a lack of political will to implement the relevant laws and regulations and management measures, even perfectly designed frameworks will remain on the bookshelves.

Finally, a better understanding of the effects of implemented management measures on the fisheries (e.g. economic efficiency, social justice, and stock health) would greatly assist in the adaptive improvement of fisheries management.

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APPENDIX 1

Top three fisheries in the large-scale, small-scale and recreational fisheries within the Indian Ocean countries

Large-scale (commercial/industrial)			
Australia (west coast)	Western rock lobster	Shark Bay and Exmouth Gulf shrimp	Shark bay scallop
Bahrain	n/a		
Bangladesh	Shrimp trawl	Bottom trawl (fish)	Mechanized gillnet fishery
Comoros	n/a		
Djibouti	n/a		
Egypt (Red Sea coast)	Purse seine	Demersal trawl	
Eritrea	Demersal trawl	Pelagic	Shrimp
India (east coast)	Shrimp	Sardines	Leiognathids
India (west coast)	Included in artisanal fisheries		
Indonesia (Pacific and Indian coasts)	Longline	Purse seine	Shrimp nets
Iran	Kilka	Demersal	Pelagic
Iraq	n/a		
Jordan	n/a		
Kenya	Inshore prawn trawling	Smaller scale reef fishery	
Kuwait	Shrimp		
Madagascar	Shrimp	Bottom trawl (fish)	Shrimp bycatch
Malaysia (Pacific and Indian coasts)	Trawl	Purse seine	
Maldives	Tuna	Bait	Shark
Mauritius	Shallow banks	Demersal	Tuna
Mozambique	Shrimp swallow water fisheries	Deep shrimp fisheries (Gamba)	Line fish (fish)
Myanmar	Commercial offshore		
Oman	Demersal trawl	Longline	
Pakistan	Shrimp	Tuna	Demersal
Qatar	n/a		
Saudi Arabia	Industrial shrimp	Industrial trawl	
South Africa (east coast)	Hake trawl	Small pelagic	Horse mackerel
Sri Lanka	Multiday	Longline	
Sudan	n/a		
Thailand (Indian Ocean coast)	Trawl	Purse Seine	Gillnet
UAE	Purse seine		
Yemen	Demersal trawl	Cuttlefish	

Note: n/a = not applicable; n.a. = not available.

Small-scale, artisanal, lifestyle, subsistence, indigenous, customary			
Australia (west coast)	Mussels	Bivalves	Mullet
Bahrain	Shrimp and crab fishery	Stake net fishery	Fish trap fishery
Bangladesh	Estuarine set bag net fishery	Trammelnet fishing	Shrimp fry collection fishery
Comoros	Small-scale	Subsistence	
Djibouti	Mixed fisheries		
Egypt (Red Sea coast)	Mixed fisheries		
Eritrea	Demersal & pelagic	Shrimp	
India (east coast)	Included in large-scale fisheries		
India (west coast)	Indian oil sardine	Bombay duck	Shrimp
Indonesia (Pacific and Indian coasts)	Gillnets	Seine nets	Trap
Iran	Kilka	Demersal	Pelagic
Iraq	Trawl fishery	Gillnet fishery	
Jordan	Mixed Gulf fisheries		
Kenya	Inshore demersal fishery	Small pelagic and sharks	Crustaceans and molluscs
Kuwait	Shrimp	Finfish	Stake net (hadra)

Madagascar	Finfish	Shrimp	Crabs
Malaysia (Pacific and Indian coasts)	Drift & gillnet	Hook & line	Bag net
Maldives	Mixed reef fishery		
Mauritius	Artisanal (Mauritius)	Artisanal (Rodrigues)	Inshore (St Brandon)
Mozambique	Beach seine	Gillnet	Line fishing
Myanmar	Coastal inshore		
Oman	Demersal & pelagic	Rock lobster	Abalone
Pakistan	Demersal	Small pelagic	
Qatar	Finfish		
Saudi Arabia	Arabian Gulf mixed fishery	Red Sea mixed fishery	
South Africa (east coast)	Traditional linefish	West Coast rock lobster	Beach seine
Sri Lanka	FRP 8' - ' Boats (OBM)	Traditional craft	Beach seine
Sudan	Finfish	Shrimps	Mollusks
Thailand (Indian Ocean coast)	Small-scale gillnet	Trap	Hook & line
UAE	Fish trap	Gillnet	Stake net
Yemen	Demersal	Pelagic	Shrimp

Note: n/a = not applicable; n.a. = not available

Recreational fisheries, including non-consumptive use			
Australia (west coast)	Western rock lobster	Abalone	
Bahrain	n.a.		
Bangladesh	n/a		
Comoros	n/a		
Djibouti	only limited recreational fishing		
Egypt (Red Sea coast)	only limited recreational fishing		
Eritrea	only limited recreational fishing		
India (east coast)	only limited recreational fishing		
India (west coast)	only limited recreational fishing		
Indonesia (Pacific and Indian coasts)	Sport fishing		
Iran	n/a		
Iraq	n/a		
Jordan	n/a		
Kenya	Big game fishing beyond the reef	Sport fishing within the reef	Shore based sport fishing
Kuwait	n.a.		
Madagascar	Sport Fishing		
Malaysia (Pacific and Indian coasts)	n/a		
Maldives	n/a		
Mauritius	Sports (off lagoon)	Recreational (lagoon)	
Mozambique	Sport fishing		
Myanmar	n/a		
Oman	only limited recreational fishing		
Pakistan	Billfish/tuna fishing	Sport fishing (pelagic)	Hand-line fishing (bottom fishing)
Qatar	Boat-based but no data		
Saudi Arabia	only limited recreational fishing		
South Africa (east coast)	Linefish	whale watching	Shark cage diving
Sri Lanka	n/a		
Sudan	n/a		
Thailand (Indian Ocean coast)	n/a		
UAE	Large pelagic	Demersal	
Yemen	only limited recreational fishing		

Note: n/a = not applicable; n.a. = not available

APPENDIX 2

State of exploitation of selected species fished

Western Indian Ocean (FAO Statistical Area 51)

Stock or species groups	Main fishing countries in 2002	State of exploitation*
Coastal Fisheries		
Bombay-duck	India	F
Croakers, drums nei	India, Pakistan	?
Emperors(=Scavengers) nei	UAE, Saudi Arabia, Tanzania, Oman	F/O
Lizardfishes nei	Egypt, Eritrea, India	?
Mullets nei	Pakistan, India, Egypt	?
Sea catfishes nei	India, Pakistan	?
Demersal Fisheries		
Demersal percomorphs nei	Oman, Yemen, Kenya	F
Hairtails, scabbardfishes nei	India, Oman	
Largehead hairtail	Pakistan	
Herrings, sardines, anchovies		
Anchovies, etc. nei	India, Pakistan	?
Clupeoids nei	India, Pakistan, Iran	?
Dorab wolf-herring	Pakistan	?
Indian oil sardine	India, Oman, Pakistan	?
Sardinellas nei	Tanzania, Egypt, UAE	?
Stolephorus anchovies	UAE	?
Wolf-herrings nei	India	?
Tunas, bonitos, billfishes, etc.		
Bigeye tuna	China,Taiwan p. China, Other nei, Spain, France	?F
Kawakawa	Iran, Maldives, Oman, India	?
Narrow-barred Spanish mackerel	India, Madagascar, Iran, Pakistan	F-O
Skipjack tuna	Maldives, Spain, France, Other nei	M ?
Tuna-like fishes nei	India, Pakistan, Mozambique, Saudi Arabia	
Yellowfin tuna	Spain, France, Other nei, Iran	?F
Other pelagic fishes		
Barracudas nei	Pakistan, Oman, Yemen, India	?
Butterfishes, pomfrets nei	India, Pakistan	?
Carangids nei	India, Pakistan, Oman, Saudi Arabia	?
Chub mackerel	Egypt	?
Indian mackerel	India, Tanzania, Oman, Egypt	?
Indian mackerels nei	Comoros, Seychelles	?
Jacks, crevalles nei	India, Pakistan, UAE	?
Mackerels nei	Mauritius, Saudi Arabia	?
Pelagic percomorphs nei	Yemen, Oman	?
Pompanos nei	India	?
Shrimps, prawns, etc.		
Indian white prawn		F
Jack-knife shrimp		F
Knife shrimp	Mozambique	F
Natantian decapods nei	India, Madagascar	F-O
Penaeus shrimps nei	Mozambique, Pakistan, Saudi Arabia, Yemen	F

* (U) underexploited; (M) moderately exploited; (F) fully exploited; (O) overexploited; (?) unknown

Source: FAO, 2005

Eastern Indian Ocean (FAO Statistical Area 57)

Stock or species groups	Main fishing countries in 2002	State of exploitation*
Shads, etc.		
Chacunda gizzard shad	Malaysia	M
Diadromous clupeoids nei	Malaysia	
Hilsa shad	Bangladesh	F
Indian pellona	Malaysia	
Kelee shad	India	F
Toli shad	Indonesia	
Coastal Fisheries		
Croakers, drums nei	India, Thailand, Indonesia, Malaysia	F-O
Mulletts nei	Indonesia, India, Thailand, Malaysia	
Percoids nei	India	
Ponyfishes(=Slipmouths) nei	India, Indonesia	F-O
Sea catfishes nei	India, Indonesia, Malaysia	F
Threadfin breams nei	Thailand, Indonesia, Malaysia	F
Demersal Fisheries		
Hairtails, scabbardfishes nei	Indonesia, India	M-F
Largehead hairtail	Thailand, Malaysia	M-F
Snoek	Australia	
Herrings, sardines, anchovies		
Anchovies, etc. nei	Thailand, India	F
Clupeoids nei	Sri Lanka, India, Australia	
Indian oil sardine	India	F
Sardinellas nei	Thailand	F
Stolephorus anchovies	Indonesia, Malaysia	F-O
Tunas, bonitos, billfishes, etc.		
Kawakawa	Malaysia, India, Thailand, Sri Lanka	F
Narrow-barred Spanish mackerel	India, Indonesia	M
Seerfishes nei	Thailand, Malaysia	
Skipjack tuna	Indonesia, Sri Lanka	M-F
Tuna-like fishes nei	Indonesia	
Yellowfin tuna	Indonesia, Sri Lanka, China, Taiwan Province of China	M
Other Tunas, bonitos, billfishes, etc.		F
Other pelagic fishes		
Butterfishes, pomfrets nei	India	F
Carangids nei	Indonesia, Sri Lanka, India, Thailand	
Indian mackerel	Thailand, India	M-F
Indian mackerels nei	Indonesia, Malaysia, Thailand	F-O
Indian scad	Thailand, Malaysia	F
Jacks, crevalles nei	India, Indonesia, Malaysia	F
Scads nei	Indonesia	F-O
Torpedo scad	Thailand, Indonesia, Malaysia	
Sharks, rays, chimaeras, etc.		
Rays, stingrays, mantas nei	Indonesia, Thailand, Malaysia	M-F
Silky shark	Sri Lanka	M-F
Marine fishes not elsewhere identified		
Marine fishes nei	Myanmar, India, Thailand, Bangladesh	M-F
Shrimps, prawns, etc.		
Banana prawn	Indonesia, Thailand	F-O
Giant tiger prawn	India, Indonesia	F-O
Natantian decapods nei	Malaysia, Myanmar, Indonesia, India	
Penaeus shrimps nei	Thailand, Australia	F
Sergestid shrimps nei	Malaysia, Thailand	M-F

Squid, cuttlefish, octopuses

Cephalopods nei	India	
Common squids nei	Thailand, Indonesia	M-F
Cuttlefish,bobtail squids nei	Thailand, Malaysia, Indonesia	M-F
Octopuses, etc. nei	Thailand, Malaysia	M
Various squids nei	Malaysia, Australia	

* (U) underexploited; (M) moderately exploited; (F) fully exploited; (O) overexploited

Source: FAO, 2005

Subregional review: Eastern Indian Ocean

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December 2003

INTRODUCTION

In the mid-1990s, FAO Members adopted many global fisheries mandates that called upon them to bring fisheries under management. The new instruments focused heavily on the management of high seas and shared fisheries resources, and included the:

- Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, commonly called the UN Fish Stocks Agreement;
- Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, commonly called the FAO Compliance Agreement;
- UN FAO Code of Conduct for Responsible Fisheries; and
- the series of International Plans of Action (IPOAs) made thereunder, including the bycatch of seabirds in longline fisheries, management of fishing capacity, the conservation and management of sharks and deterring and eliminating illegal, unreported and unregulated (IUU) fishing.

Ten years later, FAO is assessing the success of countries in implementing these instruments. The goal of this article on the State of World Marine Capture Fisheries Management is to provide an easy-to-read, informative reference for the countries of Asia that border the Eastern Indian Ocean sector. These countries, from west to east, include: eastern India, Sri Lanka, Bangladesh, Myanmar, western Thailand (Andaman Sea), western Malaysia and southern and western Indonesia.

The validity of the data for this review should be used with caution because they were produced from a variety of sources, may not have been cross-checked, and may be out of date. Where possible, the dated source of the data is supplied.¹ Furthermore, the data formats were not standard across the countries, nor was the capacity for collection or validation; thus demonstrating an impediment to responsible and sustainable fisheries management in each country and collectively for the region, and subregion – reliability and validity of fisheries management data.

The eastern portion of the Indian Ocean has a large continental shelf east and south of India that stretches almost to Sri Lanka where it drops off rapidly to the high seas. Along the northern coast it merges with the outflow of the two great rivers, the Jamuna (Brahmaputra) and Padma (Ganges), that drain much of the northeastern Indian subcontinent and form the delta off Bangladesh. The continental shelf narrows along

¹ The information for this article was gathered from the individual FAO country management reviews presented in this report, many multimedia sources, the Internet and articles, some published and some “grey literature”. A key source was an FAO questionnaire sent to fisheries contacts in each country to assist them in formatting their responses and the FAO country reviews of this report. Data provided in these questionnaires came from officials and government department files, and were reported as “personal correspondence and discussions with department officials”.

the coasts of Myanmar, Thailand and into the Malacca Straits that separate western Malaysia and the western and southern area of Indonesia.

The economic status of these countries varies considerably from some of the poorest countries in the world, such as Bangladesh and Myanmar, to more developed countries, such as Malaysia. This variation in economic status has a significant impact on the capacity of the countries for fisheries management and often determines the priorities of management objectives: in poorer countries, fisheries tend to contribute greatly to food security, employment and foreign exchange earnings; therefore, priorities tend towards the development of the sector rather than towards goals of sustainability and responsible fishing. However, independent of macroeconomic status, fisheries are the mainstay of the rural coastal communities in all countries in this area.

These countries of South and Southeast Asia are of major importance to the world's fisheries. In 2002, they comprised 24 percent of the world's population crowded into 1.36 percent of the land mass. From their combined exclusive economic zones (EEZs) of 7 million km² (6.5 percent of the world total), 45 percent of the world's fishers harvested approximately 19 million tonnes of fish per year (20 percent of the total world fish production). The majority of multispecies fish catches were taken within 12 nautical miles (nm) of the coast. This spatial distribution varied between countries, from a high of 94–98 percent to a low of 60 percent of catches, thus placing tremendous pressures on coastal stocks and resulting in the general perception of overfishing in these areas. Most of the catches came from small motorized and non-motorized fishing craft and small vessels using seines, trawls, and nets (gill, trammel, push and bag nets) for the higher-priced shrimp and demersal fishes.

Some countries, such as Thailand and more recently Sri Lanka, relied on an increasing portion of their fisheries production to come from outside their EEZs, whereas most of the other countries assessed focused on coastal fisheries. The high migration of the large pelagics, the proliferation and huge appetites of the distant water fishing nation (DWFN) fleets and the low fisheries enforcement capability has resulted in this area being a prime target for IUU fishing by offshore fleets. Challenges for fisheries in the area include IUU fishing, heavy exploitation pressures on the coastal resources and the need for commitment and capacity to implement sustainable and responsible fisheries management systems. Furthermore, the very diverse cultural and economic status of the countries and the conflicting fisheries interests of the DWFN fleet in the area complicate the implementation of effective regional fisheries management initiatives. These are some of the challenges discussed in this article.

Table 1 provides a broad overview of the 2002 fisheries situation in the countries assessed: Bangladesh, eastern India, southern and western Indonesia, western Malaysia, Myanmar, Sri Lanka, and western Thailand.

POLICY FRAMEWORK

In 2003, fisheries policies in the countries assessed were defined by national fisheries management authorities such as ministries, in Indonesia and Sri Lanka, or ministry departments, in Bangladesh, India, Malaysia, Myanmar, Malaysia, and Thailand. Policies were also influenced by the authority structure of government (i.e. centralized or devolved), the economic status of the country, the contribution of the sector to employment and government income, and the general political priorities. The wide variance of these factors in the countries assessed resulted in a similar variance in policies. However, one of the most common policies in developing countries was for increased production to address food security and unemployment. A second very common fisheries policy used in almost all countries was the continuation of the “open access” strategy for both the coastal as well as the offshore fisheries. The exception to this was Malaysia, which maintained a “limited access” and strict identification policy for its fisheries, fishers, vessels and gear. The open access policy was often defended

TABLE 1

General information related to Asian countries bordering the Eastern Indian Ocean sector

Country	Population ¹ 000s	Land area 000s km ²	Coast ² km	EEZ 000s km ²	Fishers ³ 000s	Fish production ⁴ 000s million tonnes	Value ⁵ US\$ millions
Bangladesh	135 700	144	480	141	1 100	1 900 ⁸	2 494
India	1 030 000	3 300	8 041	2 010	6 700 ⁶	6 158	8 485
Indonesia	206 000	1 900	81 000	3 100	4 100 ¹⁰	4 495 ¹¹	4 200
Malaysia	21 830	330	4 810	450	79	1 462	1 546
Myanmar	48 900	677	2 832	486	544	1 029	1 800 ⁹
Sri Lanka	19 000	66	1 770	517	180	233 ⁷	341
Thailand	63 392	514	2 624	394	727	3 470	2 400
Subregion	1 524 822	6 929	101 557	7 098	13 429	19 191	21 266
% world	24.1%	1.36%		6.52%	38.9%	24.6%	26.25%
WORLD	6 324 547	510 072		108 929	34 536¹²	78 000¹³	81 000

¹ Source: World Population Clock, year 2002 or to mid-2003 where possible, available at www.census.gov.

² Includes entire coastlines (i.e. including other ocean bodies) but it provides comparative figures for South Asia and Southeast Asia vis-à-vis the world.

³ For 2000; includes all fishers, marine and inland capture fishers and fish farmers.

⁴ Includes national production data – capture and farmed fish (FAO, 2002).

⁵ All fisheries production value – capture and farmed.

⁶ 2.4 million full time (DANIDA, 2003).

⁷ 2002 figures from major fisheries recorded.

⁸ 2002 figures and estimated that 22 percent or 415 420 million tonnes are from marine capture fisheries.

⁹ Estimate only.

¹⁰ 1.2 million commercial fishers (FAO, 2002).

¹¹ Estimated that 3.6 million tonnes were from capture fisheries.

¹² Approximately 7 470 000 of the total are aquaculture farmers (FAO, 2002).

¹³ Due to inconsistencies in China figures, China is excluded from this total (minus approximately 20–40 million tonnes).

on the grounds of employment creation and poverty alleviation, that is, using fisheries as the “employer of last resort”, without considering the consequences of such actions (including the lack of identification of alternative sectors that could assume this role if the fisheries resources were to become depleted).

Most countries had national agriculture and national fisheries plans that set their general fisheries policies. However, policies are statements of intent not of action, particularly if there is neither the commitment nor the means for implementation. Furthermore, political priorities of food security, poverty alleviation and unemployment often have higher profiles than conservation and responsible management, especially if policies were driven by short-term objectives. These varying factors manifested themselves through a range of policies in the countries assessed.

In coastal areas, usually defined as the territorial seas, the general fisheries policies were open access, increased production, and a lax or non-existent implementation of conservation measures provided for in the legislation and management plans. In the offshore fisheries areas, the general focus of fisheries policies was increased production and, where limited access or strict licensing and conservation policies existed, they were only for a few fisheries or directed towards foreign fishing vessels.

A common trend in most countries was to manage fisheries in accordance with a general country statement of development goals and to rely on management by reactive legislation as opposed to management through comprehensive plans, supported by legislation.

Bangladesh adhered to “poverty alleviation through creating self-employment and improvement of socio-economic conditions of the fishers” (Ministry of Fisheries, 2001). This translated into policy objectives that included:

- increased fish production for improved nutritional standards;
- increased employment;
- increased export revenues;
- improved socio-economic conditions for fishers and fish farmers;
- improved environmental management;

BOX 1

Consequences of using draft legislation to introduce management strategies

Legislation generally encompasses a lengthy draft and debate process, during which government officials may feel that they come to own the draft legislation, investing it with an emotional attachment that may lead to reluctance to negotiate any changes when the draft is presented to stakeholders. The draft process thus loses its flexibility. Given the interconnections that drafts contain within themselves (i.e. between different parts) and related texts of law (penal, etc.), it is usually very difficult to make significant changes in intent or scope and this means that most of the original framework and content of the draft is untouched in the draft process. This effectively minimizes the input of stakeholders in the consultative process. This is clearly not a recommended method to encourage transparency and participatory management.

- improved biological and institutional management mechanisms;
- strengthened research, extension and management coordination.

The emphasis on production as opposed to conservation should be noted, a trend that was common in many of the least-developed countries.

India devolved authority for management to its coastal states in such a manner that produced varying and sometimes conflicting or confusing policies and plans for the coastal fishers. At the central level, India endorsed an open access regime. The coastal policy, focused on production and exports, was placed under state control with support from the national government. The offshore, deep-sea (beyond 12 nautical miles [nm]) policy was developed without linkages between the coastal sectors, was based on outdated legislation and focused on increased production, with little emphasis on conservation or sustainable management. Interagency mechanisms to foster greater coordination and cooperation between national and national/state agencies for sustainable fisheries management remains a challenge for India.

Indonesia was evolving from a centralized fisheries department to a ministry responsible for facilitating the coastal fisheries policy and management planning in cooperation with new provincial and district authorities under the new Autonomy Laws (i.e. new authorities for the provinces covering 0–12 nm from the coast and for the districts covering 0–4 nm). The general policies for the ministry and the devolved authorities included:

- sustainability of marine resources;
- introduction of appropriate technical, economic and biological management measures;
- enhanced socio-economic benefits;
- supply of fish protein and food security;
- foreign exchange earnings;
- employment opportunities.

There were initiatives to update the fisheries legislation and to write new laws addressing international obligations, thereby amending policies towards conservation and sustainable management of the fisheries. In 2003, however, the focus for control measures and conservation policies was directed at curbing illegal offshore foreign fishing, while coastal resources were still largely unmanaged and uncontrolled, except for small areas where donor agencies were active.

Malaysia was the exception to the rather general uncommitted approach to sustainable fisheries management in these countries. It had a strict conservation policy accompanied

by important implementing mechanisms, manifested in their policies and strategies for the Department of Fisheries instructions to:

- enforce the Fisheries Act 1985,² amended in 1993, and the Exclusive Economic Act 1984;
- manage, conserve and rehabilitate fisheries resources to ensure their sustainability;
- conduct fisheries research;
- provide training to personnel and fisheries extension services for fishermen, farmers and downstream industry entrepreneurs;
- develop and manage inland fisheries and aquaculture;
- develop and manage marine parks and recreational fisheries;
- control fish diseases and provide quarantine services;
- monitor pollution affecting the fisheries resources;
- provide basic fishery data; and
- establish standards, inspect fisheries products and control imports and exports of fish products with the cooperation of other related agencies.

The strategies to attain these goals included:

- direct limitation of fishing effort through the licensing of fishing gear and fishing vessels through the Fisheries Licensing Policy;
- identification of nursery areas that should be protected and managed as a nursing area to ensure survival of juveniles of commercially important fish species through the use of closed areas, seasons, establishment of marine park areas and reserves (more than 40 marine park areas have been established in the last ten years) and zoning by vessel size;
- facilitation of cooperative research effort between government and academic institutions to provide data essential for the formulation of area management plans through transparent management planning involving the stakeholders – fishers and their associations, universities, government at all levels, processors and marketing agents;
- establishment of a strict monitoring, control and surveillance (MCS) scheme to enforce fisheries laws and regulations and address illegal fishing, e.g., fishing zones, licensing, reporting, etc.;
- rehabilitation of resources through the establishment of artificial reefs and coral replanting programmes; and
- conservation of endangered species and biodiversity of marine ecosystems.

The above policies and strategies, supported by increased budgets for operations, capital acquisition and maintenance, presented the best example of a commitment to sustainable and responsible fishing in the region.

Myanmar had a strict set of policies for the entire livestock and fisheries sector that focused on increased production and addressed socioeconomic issues. The stated long-term strategy and policy is for sustainability of the resources, but this was not visible in the actual daily operations that emphasized production and food security.

Sri Lanka, while recovering from two decades of internal conflict, was moving rapidly towards policies of sustainable fisheries development, especially within the offshore fishery. Its policies included open access for coastal fisheries, but it was working diligently on special area management and lagoonal committees for local management, facilitated by the Ministry and its Coastal Conservation Department, Department of

² There was an initiative by FAO in 1999/2000 to amend further the Fisheries Act to incorporate the terms of United Nations Convention on the Law of the Sea (UNCLOS) 1982, UN Fish Stocks Agreement and the FAO Compliance Agreement where these had not been included in the 1993 amendment. At this time no new amendment has been implemented.

Fisheries and Aquatic Resources and National Aquaculture Development Agency. These coastal, community management committees were moving, albeit slowly, towards the development of sustainable fisheries management policies for the coastal area.

Thailand's fisheries policies included production targets for fisheries within the EEZ (1.5 million tonnes per year) and outside the EEZ (1.8 million tonnes per year), increased aquaculture production and development of post-harvesting technology. Conservation and sustainable management goals were over-shadowed by the need for fish for food security. The new fisheries law, although feeding discontent from neighbouring countries over the lack of government control of the Thai fishing fleet, provided a new focus towards conservation and adherence to international fisheries management principles. The challenge for Thailand will be to address the interagency liaison between the fisheries department and the new coastal resources department as well as the enhanced devolution of responsibility to the provinces and coastal districts.

In summary, general fisheries policies for coastal fisheries were mostly based on open access and increased production. Policies for the offshore commercial fleets were also focused on increased production, generally allowing for open access with a minimum of management control measures on domestic fleets. The exception was Malaysia, which can be an example for the region of sustainable management policies and implementation mechanisms involving multiagency participation.

LEGAL FRAMEWORK

Structure for fisheries

The countries assessed have differing systems for fisheries management, which were reflected in the fisheries laws. As noted above, in 2003, most countries had a department or ministry responsible for fisheries and these agencies were further assisted by government or quasi-government agencies for their fisheries research, further supported by universities. The fisheries agencies were also supported by other law enforcement agencies (e.g. police, military or coast guard) for the implementation of fisheries laws. Only Malaysia and Thailand had their own effective fisheries patrol fleets (in excess of 60 vessels each), while other countries may have had one or two fisheries vessels, but these were largely old and poorly maintained.

Indonesia had a devolved fisheries management system with provincial and district government assuming authority for management of coastal areas. India had a devolved, split authority for marine resource management between the states for 0–12 nm and the national government outside territorial waters. Sri Lanka, although using a centralized system, was moving to special area management and lagoon management, with committees for management decisions to be supported by the minister and legislation. Malaysia had a centralized system, but with a comprehensive regional and local office network for implementation of its conservation and sustainable resource management legislation. Bangladesh, Thailand and Myanmar had centralized systems.

A short assessment of fisheries management structures follows. Table 2 provides a summary of the status of current fisheries legislation in each country.

Bangladesh's centralized system under the Department of Fisheries of the Ministry of Livestock and Fisheries had three principal directors and principal scientific officers, with implementation of management through district and subdistrict offices. The legal system did not address international agreements, obligations or international management principles as it was more focused on food security for its people.

India's east coast had a decentralized management system whereby the national government maintained responsibility for overall policy development and authority for the waters outside the territorial seas (12 nm), but the individual states had full

authority for legislation and management of fisheries within their respective 0–12 nm zones. The states were actively involved in discussions for collaborative management with communities and associations and the local police were their enforcement arm with assistance from the coast guard. The coast guard was fully responsible for enforcement outside the 12 nm zones. Current legislation was focused more on increased production for food security than on conservation, the latter being a low priority at that time for both the national and state governments.

Indonesia was attempting to address several issues simultaneously: (i) the devolution of fisheries authority to the provinces and districts; (ii) a shift in roles from a department to a full ministry; (iii) a shift from a centralized directive approach to one of facilitation and support to the devolved authorities as well as monitoring for compliance to national policies, strategies and standards; and finally, (iv) the coordination and support to the many agencies at all government levels involved in fisheries management in the coastal areas. As noted above, the districts had responsibility for 0–4 nm and the provinces from 0–12 nm. The national government addressed issues beyond 12 nm with its growing fisheries fleet and with support from the navy. The maritime police were to assist the districts and provinces in their individual jurisdictions. Indonesian fisheries legislation was in a state of review and rewriting while being updated to address the above as well as to accommodate the principles of sustainable management in international agreements to which it was a party. Future challenges include the changes needed to address its obligations under the new regional structure for large pelagics, the Western and Central Pacific Ocean Fisheries (WCPF) Convention, to which it was one of the 27 parties. Furthermore, the implementation of a collaborative coastal management system with licensed property rights was being approached under the new legislation. It will be a challenge to ensure that the property rights system, with aim of assisting communities, does not become overly influenced by private sector interests.

Malaysia had comprehensive fisheries legislation for sustainable management of its marine resources and was looking to accommodate newer international principles and IPOAs. The Department of Fisheries had the mandate for implementation and had further legislation for interagency support in this latter role from the Maritime Law Enforcement Coordinating Council (MECC) of navy, air force, coast guard and customs and maritime police. Its legislation for licensing and management was very comprehensive. The licensing system had the distinction of being one of the few fisheries licensing systems in the world with an ISO 9 000 approval rating.

Myanmar had a relatively old set of legislative instruments that were, however, comprehensive in their intent for increased production and conservation. Implementation of the system was not well documented and the data system in support of such mechanisms was very weak; consequently, verification was not possible. Neither collaborative management nor the incorporation of international agreements was a priority for the current government of Myanmar.

Sri Lanka had a Department of Fisheries and Aquatic Resources within a Ministry of Fisheries and Oceans, supported by other departments and quasi-government agencies addressing research, aquaculture, coastal area management and fishing ports. Cooperative mechanisms were in place between these agencies and Sri Lanka was a model for integrated community or coastal area management mechanisms with its special area management (SAMs) and lagoon management committee systems. Sustainable fisheries resources planning was effective in Sri Lanka with many examples supported by legislation, but implementation was weaker than expected, especially for limited entry and conservation measures because increased production was still

TABLE 2
Summary of fisheries legislation and systems

Country	Type of system	Current primary legislation	Comments
Bangladesh	centralized	Marine Fisheries Ordinance of 1983	Accompanying rules and regulations to this base ordinance were outdated and did not include the latest international agreements or the new principles of collaborative management. These isolated pieces of legislation did not form linkages for integrated management necessary in countries today. An ongoing donor project was assisting the Fisheries Ministry in developing new fisheries legislation.
India	mixed	Fisheries Act of 1981 and ensuing individual State Fisheries Acts	Union government (>12 nm) and maritime states (0–12 nm) responsible for separate issues but co-legislated and managed other issues – all of which were enshrined in the constitution of India
Indonesia	devolved	Fisheries Law No. 9/85 and Conservation Law No.5/90 as well as Autonomy Laws 22/99 and 25/99 for devolution	<p>The Ministry of Marine Affairs and Fisheries (MMAF, formed in 2000) was drafting a new Small Islands and Coasts Act that would have considerable impact on the management of the coastal zones, with the private sector being offered the right to procure tenure for small islands and coastal areas. How this would be implemented with the devolution of authority to districts and provinces was not known.</p> <p>FAO was involved in redrafting the Fisheries Law in 2000.</p> <p>The World Bank COREMAP¹ I Project conducted a full review of the current fisheries-related laws and made suggestions for redrafting and/or amending laws and government regulations. Incorporation of these suggestions into MMAF policies and new legislation was under consideration.</p> <p>The new Western and Central Pacific Ocean Fisheries Convention (WCPF), to which Indonesia was a signatory, was expected to come into force early in 2004 and should bear considerable impact on Indonesian fisheries management. The WCPF will focus on pelagic fisheries management, reflagging of foreign vessels to fish in other zones, IUU fishing, fisheries data collection and analysis, and licensing obligations to meet international, legal commitments to the Convention.</p>
Malaysia	centralized	Fisheries Act of 1985 (amended in 1993) and EEZ Act of 1984	Malaysia had a very comprehensive legislative system for fisheries, perhaps the most effective in the region, but it had not yet endorsed community, collaborative management or the full use of NGOs as management tools. FAO had an initiative to review the Fisheries Act in 2000, but the suggested amendments had not yet been incorporated in new legislation.
Myanmar	centralized	Myanmar Marine Fisheries Law of 1990	The lead agency was the Fisheries Department under the Ministry of Livestock and Fisheries and the law was relatively comprehensive for sustainable management, noting the absence of internationally agreed principles due to the date of the legislation.
Sri Lanka	centralized	Fisheries and Aquatic Resources Act No. 2 of 1996 and Fisheries (Regulations for Foreign Fishing Boats) Act No. 59 of 1979	This act, and all those for fisheries including the Coast Conservation Act, were rewritten in 2002 and were currently before parliament. The Act of 1996 and the new proposed Act incorporated all the international principles of responsible fisheries and international agreements to date.
Thailand	centralized	Fisheries Act B.E. 2490 of 1947	<p>This Act had been reviewed and rewritten with the assistance of FAO and was before parliament as proposed Fisheries Act B.E. 2545. If enacted, the new act would include all the intentions and clauses of recent international agreements and the Code of Conduct for Responsible Fisheries, and would give the Department of Fisheries all the authority and tools to manage its resources in a sustainable manner.</p> <p>International fisheries agreements with neighbours may be influenced by the WCPF Convention when it comes into force, especially the mutually agreed dual-flagged vessel fishing arrangements in Indonesian waters.</p>

¹ Indonesia Coral Reef Management Program. For more information, please refer to <http://www-wds.worldbank.org/>.

Source: FAOLex, 2003.

required for food security. Sri Lanka was reviewing a comprehensive, integrated-model fisheries legislative instrument to replace the current legislation, but the internal political environment had stalled this exercise.

Thailand's fisheries legislation was outdated and focused on increased production with little focus on conservation. The establishment of a new Department of Coastal and Marine Resources under the Ministry of Natural Resources and Environment will undoubtedly overlap and require joint management initiatives with the Department of Fisheries under the Ministry of Agriculture for the coastal areas. It was assumed that the offshore fisheries management would rest with the Department of Fisheries. Fish production requirements as stated in national plans, both inside and outside the EEZ, tax the capacity of the fishing fleets in their areas of operations, resulting in negative reactions from neighbouring countries regarding illegal fishing of Thai vessels in their waters. Although Thailand had not yet ratified international agreements for sustainable fisheries management, international pressures and attention to its own rapidly depleting marine resources were forcing a change in approach to more sustainable practices. New legislation, incorporating international agreements and internationally agreed sustainable management principles, was before parliament. Implementation of the changes resulting from the new legislation will be a major challenge for the future departments as the decades-old focus of increased production with minimal control mechanisms was firmly rooted in the minds and activities of current fishers.

In summary, India and Indonesia had devolved the management of fisheries to provincial/state levels and to district levels, respectively. Sri Lanka was moving towards setting an example in special area and lagoon-wide management authorities, while Malaysia had a strict and comprehensive centralized legal fisheries management system with a network of provincial and local offices. Bangladesh, Myanmar and Thailand had centralized systems with provincial, district and local offices. All countries relied on other agencies for support for implementation of fisheries laws, with Thailand and Malaysia fisheries departments adding considerable financial commitment to their own fisheries patrol fleets. Most fisheries legislations were more than five to ten years old and thus focused on increased production with little emphasis on conservation or sustainable fisheries management or on the implementation of international agreements or principles for responsible fishing. Indonesia, Malaysia, Sri Lanka, and Thailand were working on updating their respective fisheries laws to accommodate international agreements and management principles, but the other countries had not begun this updating process. The key to responsible fisheries and sustainable management will be the creation of appropriate and supportive legislation and the implementation of these laws. Aside from Malaysia, all countries were weak in implementation, thus reducing the effectiveness of their legislative efforts.

STATUS OF THE FISHERIES

The fisheries in the seven countries of this report were multispecies fisheries in the coastal areas, except perhaps where targeted for shrimp or fish fry. The coastal fisheries usually targeted small pelagic or demersal finfish (sardinellas, silverbellies, catfishes, perches, anchovies, Indo-Pacific mackerel, scads, threadfin breams, big-eyes and lizard fish), or crustaceans (squid, cuttlefish, shrimp and shellfish). Offshore fisheries were usually targeted to the tunas and other large pelagics, the demersals or shrimp.

The general status of the coastal fisheries,³ defined here as inside the 12 nm zone for ease of reference, was that they were all overfished and have been under considerable

³ "Coastal fisheries" definitions vary between countries (Table 3), but the common outer limit is 12 nm.

fishing pressures from uncontrolled, open access fisheries management schemes for several years in all countries in the region. However, Malaysia was attempting to gain control of its coastal fisheries through zoning, identification and data collection.

In all countries, except perhaps Thailand, the offshore/deep-sea fisheries were underexploited and represented a very small portion of the total catches, e.g. approximately one percent in the east coast of India, less than six percent in Indonesia and ten percent in Malaysia. The indication therefore was that, even with incentives for offshore fishing, countries were not successful in luring fishers further away from the coast. The exceptions were: (i) Thailand, where the national development plan directed a large percentage of the fishery to work outside Thai waters; and (ii) Sri Lanka, where coastal fisheries had become so crowded that fishers themselves were venturing further offshore, even to other EEZs (e.g. India and Africa).

Four of the countries in the region (India, Indonesia, Malaysia and Thailand) overlap the FAO reporting areas, but do not appear able to provide split information on catches, fishers or vessels in each of these areas;⁴ consequently, it must be noted that general figures given above contain a mix of data, some for total countries and some for the area in question, where they were available. Table 5 attempts to separate these data using very rough percentages where no accurate data were provided.

Challenges in compiling fisheries statistics

Noting the above general statements, it would be remiss of the authors to present statistics without discussing the data collection challenges faced by managers. It should be noted that, in order to understand Table 5, it is necessary to understand some of the management schemes to clarify the data provided. The information provided will indicate trends for fisheries that, despite their inaccuracy, may assist managers.

The fisheries statistics for Asian countries, and probably all developing countries, were difficult to collate as there were no common standards for collection, identification and reporting, and no effective regional organization to assist in such data coordination. This lack of standards for fisheries data reporting resulted in varying systems: (i) by species; (ii) more commonly by fishing gear type; (iii) combined fish groups such as pelagics and demersals; or (iv), a conglomeration of all the above. The classification of fisheries sectors by each country (e.g. into sustenance or subsistence fisheries, artisanal, small-scale, coastal, medium/large-scale, industrial, offshore and deep-sea fisheries) complicates the collation of fisheries data. In addition, the lack of cross checks to assure the validity and veracity of collected data automatically constrains the user in the use of such data for projections or management decisions.

None of the countries assessed, aside from Malaysia, had taken measures to identify accurately its coastal fisheries according to categories for regulation and control towards sustainable fisheries. Most countries, e.g. Bangladesh, India, Indonesia, Myanmar, Sri Lanka and Thailand did not register or license small coastal fishers (< 5 gross tonnes (GT)) or require or collect reports, even if they were legally mandated to do so. As open access was prevalent in these areas and ineffective practices of registering larger vessels in small categories were rampant, data were lost for accuracy in stock/fisheries assessments.

The offshore, deep-sea and commercial fisheries were all regulated by licences; however, verification of these licences was weak. In some countries, the lack of enforcement was such that fishers were able to ignore the licensing requirements, decreasing official statistics, and resulting in false indications of decreased effort when in fact it had become totally unregulated. Malaysia is the exception, where special vessel identification numbers had to be certified by fisheries officers and special fisheries

⁴ Except Thailand, which provided split statistics for each area.

TABLE 3
Fishing zones of countries in Southeast Asia

Countries	Fishing zone 1	Fishing zone 2	Fishing zone 3	Fishing zone 4
Bangladesh	Within 40 m depth	Outside 40 m depth		
India	From shore line out to 12 nm (territorial sea) – state control	From 12 nm out to EEZ – national control		
Indonesia	From shore line out to 3 nm	Four nm from the outer limit of first fishing zone or 7 nm from shore	Five nm from the outer limit of second fishing zone or 12 nm from shore	More than 12 nm from shore
Malaysia	From shore line out to 5 nm	From 5 nm to 12 nm	From 12 nm to 30 nm	From 30 nm to EEZ limit
Myanmar	From shore line out to 5 nm in the northern area, 10 nm in southern area	From outer limit of first fishing zone to EEZ limit		
Sri Lanka	0-1 nm – beach seines (unofficial)	0-3 nm low-powered and non-motorized (unofficial)	0-15 nm fibreglass 6-7 m outboards (unofficial)	0-EEZ, 10 m+ in length, multi-day boats (unofficial)
Thailand	From shore line out of 12 nm	From 12 nm to EEZ limit		

TABLE 4
Small-scale/artisanal and commercial/industrial fisheries

Countries	Small-scale/artisanal fisheries	Commercial/industrial fisheries
Bangladesh	Non-trawlers in Zone 1	Shrimp and finfish trawlers max. 100 GT in Zone 2
India	Coastal fisheries: non-motorized vessels and beach gear in Zone 1	All mechanized vessels (inboard engines) in Zones 1 and 2.
Indonesia	Small-scale fisheries: outboard engines less than 10 hp or 5 GT operating in Zone 1. Trawls, purse seines and gill nets not allowed, except for purse seine with a head rope of less than 120 m inboard engines less than 50 hp or 25 GT operating in Zone 2. Trawl and purse seines not allowed, except purse seines with a head rope of less than 300 m	Industrial fisheries: inboard engine less than 200 hp or 100 GT operating in Zone 3. Purse-seines allowed, except those with a head rope of less than 600 m all fishing vessels and fishing gear operating in Zone 4
Malaysia	Traditional fisheries: small-scale fisheries using traditional fishing gears (i.e. other than trawls and purse seines) with vessels less than 10 GT operating in all zones concentrating in Zone 1	Commercial fisheries: medium and large-scale fisheries using commercial fishing gears such as trawls and purse seines with vessels less than 40 GT operating in Zone 2 with vessels from 40 to 70 GT operating in Zone 3 with vessels above 70 GT operating in Zone 4
Myanmar	Coastal fisheries: vessels of less than 10 m or using less than 12 hp engine operating in Zone 1	Industrial fisheries: vessels more than 10mt or using more than 12 hp engines operating in Zone 2
Sri Lanka	Non-motorized vessels and beach gear in Zones 1 and 2 (unofficial)	All motorized vessels 0 - EEZ
Thailand	Small-scale fisheries: vessels of less than 5 GT operating in Zone 1	Large-scale fisheries: vessels of more than 5 GT operating in Zone 2

Note: Due to different legal definitions used by each country, the above are classifications between coastal and commercial fisheries of countries in the region.

tags placed on the bow post of all commercial vessels⁵ with non-removable nails. In Thailand, only key mobile fishing gears were licensed; consequently, the actual scope of fishing and resultant catches were largely unknown (e.g. the Department of Fisheries estimated 17 000 licensed fishing gears (presumed to be equivalent to fishing vessels) and the government in its 2000 census registered 53 500 fishing vessels). This again raises the question as to the validity of fisheries statistics and the use of these data to indicate the state of the fisheries.

The Southeast Asian Fisheries Development Center (SEAFDEC) has assisted in clarifying the categories in their development of responsible fisheries guidelines (SEAFDEC, 2000) to provide clarification of zones according to country definitions

⁵ Defined as medium- and large-scale fisheries using commercial fishing gears such as trawls and purse seines.

TABLE 5
Summary of fisheries and their value

Country/fishery	Licensed fishing vessels/gear in 2000	Fishers in 2000	Catch and value in 2000 (tonnes/US\$ millions)	Catch and value in 1996 (tonnes/US\$ millions)	Catch and value in 1990 (tonnes/US\$ millions)
Bangladesh					
Commercial (Shrimp and bottom trawls)	100	3 000	25 164	13 564	9 641
			n.a.	n.a.	n.a.
Artisanal (Mechanized gillnet, estuarine bag net, trammel net and shrimp fry push net)	32 860	650 000	326 914	209 795	196 685
			n.a.	n.a.	n.a.
TOTAL	32 940	653 000	352 078	223 359	206 326
India					
Coastal commercial (Shrimp, sardines and leiognathids - mechanized commercial vessels, i.e. with inboard engines)	23 966	153 360	173 254	196 569	136 648
			n.a.	n.a.	n.a.
Coastal artisanal (Shrimp, sardines and leiognathids - non mechanized, i.e. non-motorized or outboard engines)	112 118	707 300	876 746	n.a.	n.a.
			n.a.	n.a.	n.a.
TOTAL	136 084	860 660	1 050 000		
Indonesia¹					
Commercial (LL, PS, BED ShTRL)	2 815	1 166 764	910 060	836 110	524 140
			\$3 476.81	n.a.	n.a.
Artisanal (GN, seine and trap)	417 000 ²	2 911 385	1 689 980	1 313 420	1 038 640
			\$9.66	n.a.	n.a.
TOTAL	402 104 (1997)²	4 078 149	2 600 040	2 149 530	1 562 780
			\$3 477.7	n.a.	n.a.

Notes:

n.a. = not available

LL = longline

PS = purse seine

BED = bycatch exclusion device

ShTRL = shrimp trawl

The catch statistics were not separated between the Western and Central Pacific Ocean and East Indian Ocean sectors. However, as an estimate, the following percentages were used: India, where the east coast represented 38 percent of catches, 55 percent of the total number of fishing vessels of which 99 percent were less than 20 m overall length (LOA); Indonesia, where two-thirds of the catches came from western Indonesia, although these catches were not broken down into west and south Indonesia; Malaysia, where 44 percent was estimated to be taken from FAO statistical area 57, coinciding to some extent with the east Indian Ocean sector).

1. Personal communications with government officials, Jakarta, October 2003.

2. FAO Indonesian Fisheries Country Profile web page (FAO, Multiple), noting that this includes all artisanal fisheries, with 56.9 percent of the boats non-powered; 70.6 percent less than 5 GT and another 21.95 percent between 5-20 GT, all making daily fishing trips.

and then relating this to small-scale and commercial fisheries. The SEAFDEC country information has been augmented by information from the country reviews for non-SEAFDEC countries and presented in Tables 3 and 4.

Bangladesh fisheries were concentrated inside the 100 m isobath for small pelagics and demersals and shrimp. The deeper waters were unexploited by Bangladesh fishers and even the 100 licensed trawlers, which accounted for six percent of the total marine catch of 410 000 tonnes, fished within the 100 m line.

In *India* only one percent of total marine catches was from vessels greater than 20 m LOA (Mathew, 2003), while all other craft reported total marine catches of 2 700 000 tonnes (2000 last data). Only 1 050 000 tonnes of this total was caught on the east coast by 136 000 fishing vessels (24 000 of which were mechanized⁶).

⁶ Mechanized in India refers to vessels with inboard engines (source: discussions with government officials).

TABLE 5
Summary of fisheries and their value (continued)

Country/fishery	Licensed fishing vessels/gear in 2000	Fishers in 2000	Catch and value in 2000 (tonnes/US\$ millions)	Catch and value in 1996 (tonnes/US\$ millions)	Catch and value in 1990 (tonnes/US\$ millions)
Malaysia¹ (WCP Ocean)					
Commercial (TRL and PS)	3 225	17 719	409 687	n.a.	n.a.
			n.a.	n.a.	n.a.
Artisanal (Drift GN, H&L and bag net)	7 974	18 974	89 073	n.a.	n.a.
			n.a.	n.a.	n.a.
TOTAL	11 229	20 753	498 760	n.a.	n.a.
			n.a.	n.a.	n.a.
Myanmar					
Offshore (trawl and purse seine)	1 999	n.a.	648 133	428 924	390 667
			n.a.	n.a.	n.a.
Inshore/coastal (motorized and non-motorized)	28 240	n.a.	380 650	251 908	209 203
			n.a.	n.a.	n.a.
TOTAL	30 239	n.a.	1 028 783	680 832	599 870
			n.a.	n.a.	n.a.
Sri Lanka					
	Vessels in 2002	Fishers in 2002	Catch and value in 2002	Catch and value in 1997	Catch and value in 1992
Commercial (Multiday and longline)	1 614	9 684	87 300	62 000	22 000
			\$17.4	\$15.4	\$12
Artisanal (Fibreglass 18-23 ft, traditional craft, beach seine)	25 405	105 027	145 382	n.a.	n.a.
			\$90	n.a.	n.a.
TOTAL	27 019	114 711	232 682	62 000	22 000
			\$107.4	\$15.4	\$12
Thailand (Andaman Sea)					
	Licensed fishing gear²	Fishers in 2000	Catch and value in 2000 (tonnes/US\$ millions)	Catch and value in 1996 (tonnes/US\$ millions)	Catch and value in 1990 (tonnes/US\$ millions)
Commercial (TRL, PS, GN and Ent N)	1 489	19 550	675	806	n.a.
			\$259.984	\$340.355	n.a.
Artisanal (sGN, trap and H&L)	214	418	34 192	18 094	n.a.
			\$52.603	\$28.415	n.a.
TOTAL	1 703	19 968	34 867	18 900	n.a.
			\$312.587	\$368.770	n.a.

Notes:

Values are in US\$ millions, year 2002 equivalent.

n.a. = not available

WCP Ocean = Western and Central Pacific Oceans

TRL = trawl

PS = purse seine

GN = gillnet

H&L = hook and line

Ent N = entangle net

sGN = small gillnet

Small Gillnet = sGN

Trawl = TRL

1. All figures for Malaysia estimated from national figures and the assumption that 56 percent of fishers and catches are from the Western and Central Pacific Ocean side of Malaysia and 44 percent from the East Indian Ocean sector (not confirmed by government).
2. In Thailand, the Department of Fisheries licenses key mobile fishing gear only and not fishing vessels. The Department of Harbours registers all vessels for safety, including fishing vessels (total for Thailand is more than 53 000 for the year 2000).

Indonesia had approximately 625 000 capture fishers in its west and southern waters⁷ that captured approximately 1.6 million tonnes of multispecies fish of which less than six percent were from offshore vessels.⁸

⁷ Interpolation from the country review of this report and FAO Country Profile (FAO, multiple).

⁸ Two-thirds of total catches from western area (FAO, multiple).

BOX 2

Challenges in compiling fisheries data

- Basic fisheries data collection (fishers, boats and gear) and verification/cross checking mechanisms in the region were weak for all fisheries. This was especially so for artisanal/inshore fisheries (an exception being Malaysia). This makes national fisheries management planning very difficult and further complicates regional fisheries cooperation due to the lack of data and data standards.
- Categorization of fisheries by species, gear types or size of the operations was not standard throughout the subregion and thus comparisons become very difficult.
- IUU fishing within the subregion was reported to be significant, but no efforts were made to quantify this claim. Without a monitoring capacity, such anecdotal data cannot be factored into stock assessment exercises and thus constrains management planning.
- Even without up-to-date and verifiable data, anecdotal data from fishers indicated that the fisheries in all countries and especially in the coastal areas were stressed, over fished and over exploited.
- The status of the stocks in the subregion was not well known and had not been subjected to a national or regional review in several years, except perhaps in Malaysia where data were available from science-based catch analysis and stock projections.
- Efforts to establish and implement data collection standards and to carry out stock assessment effectively were evident neither in the region nor within regional organizations tasked with fisheries management. This is of the utmost importance in order to achieve management goals within the important, regionally intertwined fisheries.

Malaysia had approximately 11 200 vessels fishing on its west coast (44 percent of fishery is west coast) and they collectively caught some 500 000 tonnes, with the commercial trawlers and purse seiners taking four-fifths of this catch, the majority of which taken within 12 nm and less than 30 nm from the shoreline.

Myanmar reported catches in 2002 of approximately 1.028 million tonnes, divided between the offshore trawl and the purse seine fishery (650 000 tonnes with 2000 vessels) and the remainder from the 28 000 inshore, coastal motorized and non-motorized vessels. Figures on fishers varied considerably between studies, ranging from 540 000 fulltime fishers noted in the 2001 FAO Country Profile (FAO, Multiple) to a total of approximately 1.8 million people that derived direct benefits from all fishing activities of which 444 000 were fulltime fishers (Flewellling, 1999).

Sri Lanka reported catches of 232 742 tonnes in 2002 from 114 711 fishers (105 000 artisanal) using 27 000 fishing boats (25 400 of which were artisanal craft). Coastal fisheries were perceived as being overfished while offshore fisheries underexploited, but high levels of illegal foreign fishing in the EEZ were suspected.

In the Andaman Sea, *Thailand*, 20 000 fishers (19 500 of whom were commercial fishers) caught a reported 34 900 tonnes of fish using 1 700 licensed fishing gear of which 1 500 were defined as commercial entities that fished mainly within the coastal waters because of the narrow shelf area.

MANAGEMENT ACTIVITY

The variances in the economic situation and capacity in the countries assessed means that management strategies will also vary considerably according to government

priorities and financial capability. Bangladesh, one of the ten least developed countries in the world, cannot be expected to have the same capacity and commitment to marine resource management as Malaysia, which is moving into a much higher level of development. It is for this reason that one must appreciate each country's situation and note their relative progress in addressing responsible and sustainable fisheries and marine resource management.

The countries assessed used a wide range of fisheries management tools, some of which were very sophisticated and required considerable commitment from the government. Malaysia was such an example and can be used as a model for fisheries management, commitment and multiagency implementation. Malaysia had utilized almost the full range of management tools, including:

- limited entry fishing for all categories through a strict licensing regime;
- licensing of every fisher, vessel and fishing gear as a basis for a comprehensive and complete data collection and analysis system;
- establishment of complete terms and conditions of licensing that include a unique vessel marking system for ease in identification at sea, plus zoning, reporting requirements and closed areas and seasons;
- establishment of a comprehensive data collection and analysis system for applied fisheries research, future fisheries management planning and operational monitoring and compliance controls;
- establishment of Marine Protected Areas (40 in past ten years);
- development of a comprehensive legal system supporting sustainable fisheries management, enforced by significant penalties that form a deterrence to non-compliant activities and an integrated law enforcement mechanism for support in implementation of the fisheries management plans;
- establishment of a zone system to protect small, traditional fishers who lack the mobility of other larger fishers and also to reduce vessel and fishing gear conflicts;
- establishment of an effective monitoring, control and surveillance (MCS) system to implement management plans, including closed seasons, closed areas and gear restrictions;
- development of a knowledgeable and supportive judiciary that levies appropriate and deterrent penalties for illegal fishing activities; and finally,
- commitment of government to fisheries management through regular, increased budgets to maintain the Department of Fisheries (DoF) patrol fleet of 60+ patrol vessels.

Malaysia's fisheries management is an example for other countries in Asia, but it depends on sincere commitment, funding, capacity building and integrity of its officials for success, especially for the implementation component.

Nevertheless, there are two tools in the management toolbox that Malaysia had not utilized to the fullest. The first tool includes participatory management practices with resource users (fishers, their organizations and communities) for input into the management processes. This is to encourage fishers to gradually accept the joint stewardship role, through collaborative management with government, of their resources and to ease the financial burden on government. The participatory approach can result in cost sharing and acceptance of partial responsibility by communities and fishers for the health, welfare and conservation of the fisheries and coastal resources. The second tool useful in bridging the gap between centralized, or even devolved government systems, and the public stakeholders (i.e. fishers, tourism industry, coastal trade, etc.) is the use of non-governmental organizations (NGOs) to assist in bringing the message to the communities. Malaysia was reluctant to embrace these two tools until it clearly identified the relevant stakeholders. Furthermore, Malaysia noted that, from the experiences of neighbours, the choice of NGOs is very important to

ensure a supporting mechanism as opposed to “feeding” a confrontational mechanism. Other countries in the subregion have dealt with these concerns effectively and these experiences are noted.

Bangladesh's fisheries policy was focused on increased production for food security, a key government priority for all sectors. Although the base law required updating, the mechanisms were in place to promote sustainable fisheries management. However, problems arose from a lack of government funding to implement these mechanisms and to find alternative employment and food security sources. Lack of sustainable fisheries management could only hasten the depletion of fish stocks and result in a worsening economic situation due to a loss of a renewable resource base. In 2003, the management system was non-participatory and not oriented to conservation or sustainability, nor was there the internal capacity to ensure compliance with the management strategies. Bangladesh was aware of the consequences of inaction, but given its limited financial capacity, its focus was on issues for food production in coastal fisheries. International initiatives were a low priority for Bangladesh.

India's east coast had a split management strategy because of the devolved coastal management authority to the states. This strategy resulted in a high variance of management systems in zoning and the adoption of regulatory measures (e.g. differing coastal zone definitions, licensing regimes and closed seasons). Minor gear restrictions and spatial restrictions were in place but enforcement appeared to be ad hoc. In areas of national jurisdiction, the focus was on eliminating illegal foreign fishing with little compliance checking of local vessels. Fisheries focus was on increased production; however, the Ministry of Environment and Forests was moving towards conservation, thus creating a potentially sensitive and challenging situation for the future. India did, however, have a significant track record in the use of NGOs as a management tool, ensuring participatory consultation at the state level with fishers who were well represented by associations and community groups. In summary, although devolved and participatory management practices were in place for the coastal areas, there appeared to be a lack of integration, coordination, cohesiveness and commitment to sustainable management and implementation of current laws at both the state and national level.

Indonesia's fisheries management processes relied on legal instruments to manage the fisheries as opposed to formal management planning schemes. Management goals were set for the Ministry of Marine Affairs and Fisheries (MMAF) and included: harvesting limits based on scientific information; reduction of conflict between users; conservation and prevention of overexploitation; improved quality to users and reduction of waste, as well as increased production and use of new or little known species. The goals also included stakeholder participation and devolution of management authority to the provinces (coast to 12 nm) and districts (coast to 4 nm) with greater consultation for management planning, implementation and conflict resolution. The MMAF were also finalizing a new Small Islands and Coasts Law that intended to bring in communities and the private sector as investment partners to secure tenure of coastal areas in an attempt to implement sustainable coastal resource management. This was an innovative and challenging measure, if one considers the difficulties in monitoring these agreements for compliance and integration with the devolution process.

Unfortunately, these measures had not shown an appreciable positive impact on stock recovery, stock stability, or the realization of sustainable management in either the commercial or coastal/artisanal fisheries. The apparent lack of commitment to data collection and verifiability of such data and enforcement of the laws continued to have

a negative impact on stock recovery, and hence enhanced fishers' financial returns. The foreign joint venture scheme vessels (900+), accurate data collection and analysis and integration of international agreements and principles were continuing management challenges. In addition, the challenge of interagency coordination and cooperation mechanisms between national agencies were made more complicated by the devolution to the provinces and districts. FISHCODE⁹ assistance provided tools to assist in the process towards responsible and sustainable fisheries management; however, the financial and political commitment to implement this process through the country had not been fully established.

Myanmar's fisheries management strategy remained largely unknown as a result of insufficient information. Fisheries legislation, although dated, appeared to exist and was implemented onshore and included licensing, port inspections, movement reports, gear and spatial restrictions and effort controls, but the effectiveness of these measures was not known or available. At sea, control mechanisms and the implementation of international agreements and principles for management were largely ignored because of a lack of resources and the focus on food security and production.

Sri Lanka had all the tools for sustainable management, especially with the new fisheries law awaiting parliamentary approval, but civil strife and a lack of funding and commitment at the local level with respect to implementation of the law were the challenges facing the Fisheries Ministry. Sri Lanka did, however, have a very effective lagoon management system and an integrated, multisector/agency special area management (SAM) system, complete with a formal conflict resolution process. These systems could become a model for participatory and interagency management planning mechanisms for other countries. Management planning was more by regulatory fashion than formal presentation of management plans. The open access strategy was taxing coastal resources and forcing fishers further off shore in small ill-equipped vessels where they were coming into conflict with international fisheries agreements and risking their safety at sea. The management challenge remained in the implementation phase of the management strategies, that is, remaining weak, except in small pockets of the SAMs and some lagoon management committees where there appeared to be progress that could be monitored and replicated.

Thailand was moving into a new era of fisheries management whereby its focus on increased production was to be tempered by compliance and implementation of international agreements and sustainable fisheries management principles. The centralized management approach, focused on open access, production and only large mobile fisheries, was being countered by the need for the government to take responsibility for its fishing fleet outside its waters and to regulate its fleet inside in order to prevent increased conflict and pressures on coastal resources. The new Fisheries Law BE 2545, currently under consideration in Parliament, intended to address international obligations, move towards sustainable fisheries and encourage greater stakeholder participation, was being encouraged by ongoing donor initiatives. Management control measures were being developed, but as in all countries, the challenge remains in the commitment to implementation. The interagency coordination mechanisms between ministries, provinces and districts will be another challenge that has been expanded with the establishment of the coastal resources department and devolution of authority to provinces and districts. Again, training in the benefits of the

⁹ Interregional programme of assistance to developing countries for the implementation of the FAO Code of Conduct for Responsible Fisheries – called the FISHCODE Programme (www.fao.org/fi/fishcode.htm).

BOX 3

Challenges for the future:

- Encouragement of the commitment from legislators, judiciary, fisheries authorities and stakeholders is necessary to implement responsible fisheries management measures, especially for the implementation of FAO's IPOAs for IUU fishing and management of fishing capacity, the two main concerns in Asian fisheries.
- Legislation updates are needed in all countries except Sri Lanka and Thailand, which were considering updates in their respective parliaments.
- Countries need to consider that IUU fishing is not only illegal foreign fishing, but includes all illegal, unreported and unregulated fishing activities, many exercised by their own national fishers.
- Regional cooperation to implement sustainable and responsible fisheries practices has yet to take an active role in the subregion. Very little has evolved from regional or subregional organizations with respect to implementation of sustainable practices for capture fisheries in Asia, the exceptions being the Indian Ocean Tuna Commission (IOTC) efforts in the Indian Ocean and the Southeast Asian Fisheries Development Center (SEAFDEC) efforts in aquaculture and in regional guidelines to implement the FAO Code of Conduct.
- Regional cooperation to set minimum standards for fisheries management, data requirements and information exchange could be an effective step towards responsible fisheries, followed by more complex issues (e.g. regional cooperation for enforcement).
- Obligations under many of the international agreements signed or ratified over the past 10-20 years are still outstanding with respect to implementation in many of these countries and new obligations under the Western and Central Pacific Fisheries Convention (WCPFC) for Indonesia will present further challenges.
- Implementation of basic and verifiable fisheries licensing, registration of all fishers, vessels and gear, and data collection systems are the general first steps required for responsible fishing and fisheries management.
- Implementation of the laws through preventative and deterrent MCS operations are the second steps.

FAO FISHCODE Programme, much of which have taken place in Thailand, could be useful in this transition from the focus of fisheries on production to responsible and sustainable fisheries management in Thailand.

In summary, in the countries assessed, excluding Malaysia, the open access strategy was still in place. Legislation was generally outdated, but in several cases had adequate spatial, temporal, gear and participatory restrictions or permissions, enabling the move towards sustainable fisheries management. The commitment to implementation of these mechanisms, however, was very weak. The varying socioeconomic situations of each country resulted in a mix of fisheries management goals, with the prevalent objective being increased production, especially in the poorer countries such as Bangladesh. The concept and implementation of international fisheries agreements or principles for sustainable management were largely ignored in the poorer countries because of financial constraints. Changing management strategies and structures and lack of commitment hampered the implementation in other countries. Malaysia can be a model for sustainable fisheries management, including multiagency implementation mechanisms; while India and Sri Lanka can provide lessons and strategies for stakeholder participation and integrated multisector, multiagency input into management planning. Thailand was in a state of flux from several decades of focus on increased production

BOX 4

Deterrence as a management tool

Experience shows that when the risks of being apprehended are low due to ineffective monitoring and the penalties are low in comparison to the potential gains, infractions will increase. Inversely, if the deterrence level is increased, fewer infractions should occur. Deterrence as a tool requires understanding and support of the prosecutors and judiciary through knowledge of the damage that illegal fishing has on the resources and the negative social and economic impacts for fishers. Finally, a basic data system for licensing and registration, the latter possibly free of charge, vessel marking and identification, and data reporting can facilitate fisheries control mechanisms and enhance deterrence, thus moving closer to sustainable fisheries management.

but was moving towards sustainable fisheries management. Indonesia was also in a state of change (i.e. devolution from a central authority to provincial and district management with central facilitation and support). Bangladesh and Myanmar were primarily focused on food security issues and were not expected to make major changes towards sustainable fisheries management in the near future.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

All countries assessed reported that they had not yet implemented any cost-sharing arrangements with fishers or stakeholders to address increasing management costs. Increases in consultation with stakeholders, increased pressures on the resources resulting in overfishing, conflicts and subsequent increases in infractions had led to higher costs for fisheries management. Licence fees provided minimal contributions to offset such management costs. It was only in Malaysia that a significant commitment from government was provided to increase the fisheries-related budgets to enhance fisheries management capability and capacity. All other countries reported that funds were insufficient to carry out their mandates.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Table 6 summarizes the status of signatures and ratifications of international agreements for the countries reviewed. Many countries had included internationally agreed sustainable and responsible fisheries management principles in newer legislative instruments, but these principles were not addressed in older legislative instruments or amendments. In all cases, the implementation of these principles was weak, with the exception of Malaysia, possibly because of a lack of political and bureaucratic commitment in the subregion.

In the case of FAO IPOAs,¹⁰ some of the countries reported that they had commenced national implementation activities (see Table 7), but these appeared to be in the form of meetings with stakeholders. In most cases, supporting mechanisms for management (science, data collection, licensing/registration of all fishers, limited access, reports and cross verification of catches and landings, monitoring and enforcement) were not in place.

Some countries had reported commencing work on national management plans for the IPOAs. The two most important IPOAs for the subregion are the management of fishing capacity and IUU fishing, both of which would require the existence of a

¹⁰ IPOAs were published by FAO (1999) with the aim of reducing the incidental catches of seabirds in the longline fishery, conservation and management of sharks, management of fishing capacity and prevention, deterrence and elimination of IUU fishing.

TABLE 6
Status of international agreements

Country	UN Law of the Sea Convention		UN Fish Stocks Agreement*		FAO Compliance Agreement**	
	Signed	Ratified/ Acceded	Signed	Ratified/ Acceded	Signed	Ratified/ Acceded
Bangladesh		27 July 2001				
India (east)		29 June 1995		19 Aug 2003		
Indonesia		3 Feb 1986				
Malaysia		14 Oct 1996				
Myanmar		21 May 1996				8 Sept 1994
Sri Lanka		19 July 1994		24 Oct 1996		
Thailand	Yes					

* United Nations Convention on the Law of the Sea Agreement for the Implementation of the Provisions of the Convention relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks

** Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas

TABLE 7
Status of national plans of action (NPOAs)

Country	Management of fishing capacity		Reducing incidental catch of seabirds in longline fisheries	Conservation and management of sharks	Prevent, counteract and eliminate IUU fishing
	No. of assessed fisheries	NPOA	NPOA	NPOA	NPOA
Bangladesh		No	No	No	No
India (east)	Capacity to be measured by 2005	Plan being formulated	Not perceived as a problem	Ten species protected since 2001; resources being assessed	Under investigation; plan being formulated
Indonesia		2004	2004	2004	2003
Malaysia	All coastal	Yes (ongoing)	No	Yes (ongoing)	Yes (ongoing)
Myanmar		No (not a problem)			Yes (ongoing)
Sri Lanka		Yes (ongoing)	No	Yes (ongoing)	Yes (ongoing)
Thailand		Yes (ongoing)	No	Yes (ongoing)	Yes (ongoing)

licensing and registration system to enumerate clearly the fishers, vessels and fishing gear, generally lacking in all countries, except Malaysia. SEAFDEC was attempting to assist by developing regional guidelines for the implementation of the FAO Code of Conduct for Responsible Fisheries, but it appeared that the reception, assumption and integration of these guidelines by its members were slow.

In summary, there has been considerable verbal and written support for sustainable fisheries management, international agreements to which most countries are a party and for the FAO Code of Conduct for Responsible Fisheries and its IPOAs to which all FAO Members have given unanimous agreement. In practice, however, these plans have generally not yet been adopted by national authorities, and hence, have not been implemented in the field. If allowed to continue, several important fish stocks in the region may reach levels of severe depletion or collapse before action is taken, resulting in serious impacts on the social and economic status of each country and also gravely impacting national peace and security. Therefore, a focus on action by regional organizations would be a positive step towards the goal for implementation of global fisheries mandates and initiatives.

PARTICIPATION IN REGIONAL FISHERY BODIES

The common subregional and regional fishery bodies to which the countries are members, or in which they participate include:

APEC – Asia-Pacific Economic Cooperation formed in 1989 to enhance the economic growth and prosperity of its 21 members. It has no treaty obligations, decides by consensus, represents 2.5 billion people, has a combined GDP of US\$19

trillion and 47 percent of the world trade. However, it appears to have accomplished little in the way of regional coordination for the implementation of sustainable fisheries management agreements or principles.

APFIC – The Asia-Pacific Fisheries Commission formed in 1993 through several name changes from the 1948 Asia-Pacific Fisheries Council. It has some 20 members and has the objective to ensure full and proper utilization of living aquatic resources of the Asia-Pacific Region, development and management of fishing and culture resources, and the development of processing and marketing. The Commission has no regulatory powers. It appeared to have the greatest potential for actually implementing regional fisheries management programmes until it cancelled its subcommittees on these matters. However, FAO notes it is attempting to revive interest in this Commission as a tool for assisting countries in responsible fisheries management.

CCAMLR – The Commission for the Conservation of Antarctic Marine Living Resources was formed under Article IX of the Antarctic Treaty System in 1982 with a preliminary concern for the krill fishery. It now has 24 members with 7 non-member participants and addresses Antarctic marine resource issues.

CCSBT – The Commission for the Conservation of the Southern Bluefin Tuna has five active members and two other countries considering membership at this time. It was founded in May 1994 to address the conservation of bluefin tuna. Indonesia is involved in this organization because of its interest and role in the conservation and protection of southern bluefin tuna.

IOTC – Indian Ocean Tuna Commission, evolved from the Indo-Pacific Tuna Programme into the new commission in March 1996. It has 20 members with a common objective to manage the tuna and tuna-like species of the Indian Ocean and adjacent seas. This organization has taken several steps to assist countries in sustainable fisheries management, but it still has to encourage standardization in fisheries data systems.

SEAFDEC – The Southeast Asian Fisheries Development Center was formed in 1967 to promote fisheries development in Southeast Asia through research, training, information exchange to improve food supply and rational utilization, and development of fisheries resources to improve the livelihood of the people of Southeast Asia. SEAFDEC has 10 members, many from this subregion. The thrust of SEAFDEC to address the Code of Conduct for Responsible Fisheries through the development of regional guidelines for countries is a new and positive role for this organization.

WCPF – The Western and Central Pacific Ocean Fisheries Commission has a long-term objective for the conservation and sustainable use of highly migratory stocks in the West and Central Pacific Ocean area. Twelve countries have ratified this Convention and it is expected to have the 13th ratification early in 2004, thus bringing it into force. There have been 27 countries involved in the several years of development of this convention, most of these countries being expected to become members of the Commission. Indonesia is a signatory to the Convention. This Fisheries Commission will have some mutually agreed regulatory powers.

Tables 8 and 9 reflect the status of membership of the countries assessed of regional and intraregional fisheries bodies.

None of the subregional organizations, except for the new WCPFC, have regulatory powers, which may explain why the organizations have not been as effective as expected in bringing about sustainable fisheries management schemes in the region. Without regulatory powers, there is no obligation for members to cooperate or implement agreements. In essence, subregional organizations have no “teeth” and have been reduced to “paper tigers” as opposed to engines for economic development, conservation and sustainable renewable resource management. This may change when the subregion becomes exposed to the long-standing and successful South Pacific Forum-type organizations that include obligations for action and respect implementation of agreements.

TABLE 8
Participation in regional organizations

Country	Indian Ocean		
	APFIC	IOTC	SEAFDEC
Bangladesh	M		
India (east)	M	M	
Indonesia	M		M
Malaysia	M	M	M
Myanmar	M		M
Sri Lanka	M	M	
Thailand	M	M	M

Note: M = Member

TABLE 9
Participation in intraregional organizations

Country	Pacific Ocean		Trans-ocean	
	APEC*	WCPFC**	CCAMLR	CCSBT
Bangladesh				
India (east)			M	
Indonesia	M	S		C***
Malaysia	M			
Myanmar				
Sri Lanka				
Thailand	M			

Note: M = Member; C = Cooperates but not a member; S = Signed

* APEC General Membership.

** On 4 September 2001, the Convention that will create the WCPFC was signed by 19 countries but has not yet entered into force.

*** Indonesia's agreement is being pursued as a matter of urgency as the Indonesian catch, which is significant, includes mature fish taken in the only known southern bluefin tuna spawning ground. The Commission is developing a status of "cooperating non-member" and discussions will be held with Indonesia on participation with this status as an initial step in formal engagement with the Commission. See CCSBT Web site: www.ccsbt.org/docs/about.html

SUMMARY AND CONCLUSIONS

The seven eastern Indian Ocean countries reviewed are of major importance to the fisheries of the world. In 2003, the Asian Subsector of the Eastern Indian Ocean Sector comprised 24 percent of the world's population, crowded into 1.36 percent of the land mass. From their combined EEZs of 7 million km², 45 percent of the world's fishers harvested some 19 million tonnes of fish (20 percent of the total world fish production). The majority of multispecies fish catches were taken within 12 nm of the coast, i.e. the coastal areas. This spatial distribution varied between countries, from a high of 94-98 percent to a low of 60 percent of catches from within 12 nm of the coast, thus placing tremendous pressures on coastal stocks in these areas by small motorized and non-motorized fishing craft and small vessels.

The proliferation of the attitude of "fisheries are the employer of last resort" was still evident, but the aging demographics of fishers in many of the countries assessed indicated the lack of popularity of fishing as a livelihood. However, rural, coastal communities remained almost totally dependent on these resources for their survival.

The fisheries in the offshore waters of the region were assumed to have room for expansion; however, a precautionary approach in the region would indicate that the surveys of the 1980s are outdated and merit review and resurveying before taking action based on these surveys. The fisheries in the coastal, inshore areas were found to be at or exceeding maximum sustainable yields (MSY) in the late 1980s and early 1990s. However, "open access" policies were still prevailing in all countries assessed, with one exception: in Malaysia, limited access mechanisms were in use for fisheries

management. In all countries assessed more than 90 percent of all recorded catches were taken in the coastal/inshore areas; therefore, one could assume that these stocks are severely overstressed.

Responsible fisheries management mechanisms are overdue and would include the availability of viable data for planning; responsible and precautionary decision-making involving stakeholders; limited entry as a key principle of management; supporting legislation; formal and effective interagency mechanisms for cost-effective operational planning and action; and a commitment to compliance and preventive and deterrent enforcement. Necessary to this process would be the political and field-level commitment and capacity for implementation of such management measures.

Malaysia had one of the more advanced, centralized fisheries management systems in the subregion, and reputedly, in the world. This can be a model for Asia for marine capture fisheries for:

- management planning;
- inclusion of international agreements and management principles;
- research;
- data collection and analysis;
- supporting legislation;
- control mechanisms in use, including licensing of fishers' gear and vessels, vessel marking and identification, data reporting, collection and verification, and limited access;
- monitoring of fishing activities for compliance;
- joint interagency enforcement mechanisms (Maritime Enforcement Coordinating Committee - MECC); and
- judicial support through the creation of a high level of deterrence (i.e. a high risk of being apprehended and severe penalties outweighing the potential benefits from illegal fishing).

Sri Lanka with its Special Area Management and Lagoon Management committees can be an example for involvement of stakeholders in the wider scope of area management and integrating sectors for development, including fisheries. India and Indonesia, with their devolved management to the provinces/states and districts, were examples of learning from the experiences of other countries (e.g. the Philippines) and could be new models for the future implementation of such strategies. Draft fisheries laws being considered in Sri Lanka and Thailand included sustainable management ideas and principles covered in international agreements, the FAO Code of Conduct for Responsible Fisheries and its IPOAs. Implementation of these legislative instruments could be used as learning experiences for other countries of this region.

Subregional organizations for fisheries management are fora for discussion, effective management planning and training. However, if this training is not put to use and there is no commitment for regional cooperation and harmonization of strategies for sustainable fisheries management implementation, the subregional organizations will remain ineffective.

One such subregional fishery body, APFIC, was an organization that had the potential to address these concerns. However, APFIC was rendered ineffective by the cancellation in 1997 of its four working groups. The WCPFC is another regional fishery body that could potentially be effective and would directly impact Indonesia, but there is concern that without a commitment towards implementation from the countries involved, this organization could also suffer from lack of support and inadequate and verifiable fisheries data for decision-making, thus severely weakening WCPFC's potential to conserve the large pelagic stocks of the Asia-Pacific region.

Sustainable fisheries management is not only a series of planning and discussion sessions; it requires a commitment for implementation, demonstrated by funds and political will. Efforts by individual countries and through regional cooperation to show

this commitment for implementation will be the single greatest challenge for the sector to realize sustainable and responsible fisheries management.

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Subregional review: Northwest Indian Ocean

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INTRODUCTION

The countries of the Near East that are considered in this regional review of the northwest Indian Ocean border the Indian Ocean, Persian Gulf, the Red Sea, the Arabian Sea, Gulf of Oman and Gulf of Aden. These sea areas lie between 12° north latitude and 30° north latitude and are generally characterized by very high air and water temperatures during summer, particularly in the shallow Gulf areas. The influence of the southwest monsoon is an important feature of the more southern areas and drives oceanic processes, including major upwellings, along the coasts of western India and Oman. In the northern areas, there is little freshwater input from either rain or major rivers and coasts usually border desert or arid mountain areas.

The countries covered by this review and the recorded marine fisheries landings for 2002 are shown in Table 1. The west coast of India dominates landings, accounting for around 62 percent of the total landings of 3 199 644 tonnes for these countries.

Production in the region is clearly concentrated in the high productivity areas of the Arabian Sea and Gulf of Oman,¹ with the west coast of India, the Islamic Republic of Iran, Oman and Pakistan (all of which have coasts in these areas) dominating the landings. In the other areas of the Red Sea and Persian Gulf, landings are significantly less and generally reflect the much lower productivity of these areas, currently producing only about 3.7 percent of world landings of marine fish.

Marine fish landings of the region are, of course, a combination of the productivity, and therefore abundance of commercial marine fish species, and the fishing effort that is expended in capturing these fish. In many areas, marine fish resources are overexploited² and management of marine fish resources is generally not well developed in the region.

Effective management of the marine resources of the region is complicated by the often shared nature of the resources, particularly (but not restricted to) pelagic species. This is further compounded by the lack of regional stock assessments of these resources and the general scarcity of information on major exploited fish stocks.

With shared stocks being a feature of the region, multilateral and bilateral cooperation in fisheries management is vital for overall management of marine fisheries. However, regional cooperation in fisheries management in the region is poorly developed. Although the Regional Commission for Fisheries (RECOFI) brings together the countries of the Gulf as well as Oman, it has not yet been able to address any regional management initiatives. There is no regional organization for fisheries management for the Red Sea or Gulf of Aden although fisheries issues are sometimes addressed within the broader context of marine environmental protection through the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA).³ There is no formal mechanism for bringing the major fish producers

¹ With extensive upwelling areas off the Indian coast and also the southern Omani coast.

² There are, however, some exceptions such as pelagic stocks in Djibouti, Eritrea and perhaps Yemen.

³ <http://www.persga.org>

TABLE 1

Landings of marine fish and seafood in 1990 and 2002 in the Northwest Indian Ocean

Country	Marine landings (tonnes)	
	1990	2002
Bahrain	8 105	11 204
Djibouti	360	350
Egypt (Red Sea coast)	39 924	72 889
Eritrea	4 752 ¹	7 852
India (west coast)	1 668 707	1 983 089
Iraq	3 754	24 000
Islamic Republic of Iran	199 007	269 000
Israel (Red Sea coast)	40 (est.)	80 (est.) ²
Jordan	2	176
Kuwait	4 042 ³	5 900
Oman	119 783	142 670
Pakistan	364 631	418 104
Qatar	5 702	6 880
Saudi Arabia	40 631	55 330
Somalia	22 295	17 850
Sudan	1 500	5 008
United Arab Emirates ⁴	25 000	20 000
Yemen	77 443	159 262
Total	2 585 678	3 199 644
Total western Indian Ocean marine landings⁵	3 294 255	4 240 174
Percent of western Indian Ocean landings	78.5%	75.5%
Percent of global marine landings	3.6%	3.7%

Note: Catch data include marine mammals, crocodiles, corals, pearls, sponges and aquatic plants.

¹ Data are for 1993 as previous data were included in Ethiopian statistics.

² No landings are recorded for Israel in 2002 although it is understood that some marine landings were made.

³ Landings reduced compared with the immediate preceding years because of invasion and occupation in August 1990.

⁴ These landings are the author's estimates based on a new data collection system being introduced in the United Arab Emirates. The landings are significantly less than the previously reported landings for 1990 and 2002 of around 95 125 tonnes and 97 500 tonnes, respectively.

⁵ Not adjusted for author's estimates.

Source: FAO, 2004a.

of India and Pakistan into regional management organizations with the other countries considered in this review. However, the extent of sharing of stocks between India in particular and the other countries of the region is probably not as great⁴ as the extent of stock sharing among other countries.

Countries of the region with significant or developing tuna fisheries⁵ are members of the Indian Ocean Tuna Commission and there are a number of bilateral cooperation agreements in place. However, most of these bilateral agreements⁶ are development-orientated or technical cooperation agreements and have not been designed to address management of shared stocks.

Many of the countries of the region have introduced policies to develop their fisheries sector with such policies often including subsidies to fishers and fishing companies. In the same vein, fishing capacity limitation programmes are rare in the region.⁷ In addition, limited entry policies (where they exist) generally only apply to industrial fisheries and very few of the dominant artisanal fisheries have any barriers to entering the fishery. As a result, fishing effort has increased significantly in many

⁴ Many major stocks, such as Bombay-duck and many of the shrimp species are endemic to India and are not found elsewhere in the region. Some small and large pelagic stocks such as Indian mackerel and tuna species are probably shared but little information is available on the extent of any such stock sharing.

⁵ Including Eritrea, India and Oman.

⁶ For example, the agreement on fishing between Egypt and Kuwait (FAO, 2004b).

⁷ Exceptions are Eritrea, the Islamic Republic of Iran and the industrial fisheries of Kuwait and Saudi Arabia.

countries since 1990, while landings have increased only by a very modest 12.3 percent over that same period (see Table 1). Comparatively, increases in landings elsewhere in the western Indian Ocean have been far greater, with the result that the landings from the countries considered in this review now comprise a smaller proportion of overall western Indian Ocean landings than they did in 1990 (Table 1).

In those countries where entry restrictions to the artisanal fishery have been imposed, these restrictions have not been particularly effective because of loopholes in the regulations. For example, in Saudi Arabia, although there is a restriction on new entrants to the artisanal fishery and a boat replacement policy in place, these have been negated by fishers legally building larger vessels that can carry and operate more fishing gear (fish traps for example). As a result, fishing effort has continued to increase despite the entry restrictions.

Therefore, increases in fishing capacity and fishing effort, particularly in the dominant artisanal fisheries, have resulted in increasing pressure on many regionally important fish stocks and a number of these are now believed to be significantly overexploited.⁸ The exact status of many stocks is, however, not certain because of the lack of comprehensive stock assessment research in the region.⁹

It is worthwhile noting that the landings of marine fish by many of the countries considered in this review have been impacted, and often dramatically so, by conflicts in the recent past. For example, the 1991 Gulf war resulted in the destruction of Kuwait's fishing fleet with no landings being possible between August 1990 and about April 1991. Oil pollution, floating unexploded ordinance, reduction in sea water temperatures as a result of burning oil fires¹⁰ and destroyed infrastructure also impacted the fisheries of Iran, Qatar, Saudi Arabia and other Gulf countries. In Eritrea, conflicts following independence in the early 1990s hampered the development of a viable fishing industry, while the capacity for national fisheries management was severely degraded for a number of years following the reunification of Yemen during the 1990s.

The impacts of such conflicts and other emergency situations on national capacities to manage fisheries and also on fisheries infrastructure and the landings themselves are rarely considered in overall national fisheries policy development. However, the frequency of such events in the region makes these impacts an important part of overall food security and fisheries planning.

Despite these difficulties, there are indications that the management of fisheries in a number of countries in the region is being brought under control and, in particular, the issue of controlling and limiting fishing capacity is slowly being addressed. However, given that many of the region's fisheries are based on small-scale artisanal fisheries rather than industrial fisheries, the social and microeconomic implications of such fishing restrictions will need careful management.

REGIONAL FISHERIES POLICY FRAMEWORK

The policy framework of countries in the region is rarely stated explicitly, although some legislation (particularly that of Djibouti, Eritrea and Oman) specifies the overall

⁸ This is further examined below in discussions on the status of fish stocks.

⁹ The region generally suffers from a lack of technical expertise in fisheries stock assessment (although India and a few other Gulf countries are exceptions), the infrastructure to undertake such stock assessments and the difficulty of undertaking regional research. Much of the previous stock assessment work in the region has been done by aid agencies or international organizations such as FAO.

¹⁰ Sea water temperatures were reduced by 2–3° C in Kuwaiti and Saudi Arabian waters, with maximum reductions of 7° C being recorded. This led to reduced growth rates and reduced biomass of major commercial species, including shrimp. Catch rates in the Kuwaiti and Saudi Arabian shrimp fisheries in late 1991 were reduced by about 59 percent compared with prewar catch rates. Modelling has shown that such impacts on commercial fisheries lasted for a period of around two years from the end of the conflict in early 1991.

objectives of fisheries management. In the general absence of such an explicit policy framework, the author has used (a) information from discussions with fisheries management agencies, (b) the form and content of the national fisheries legislation, (c) the way in which national legislation is interpreted by the management agency and, most importantly, (d) the actions and the priorities of the management agency, to deduce the policy framework of countries within the region.

There is no agreed marine fisheries policy framework for the region and regional coordination in setting a consistent policy framework is weak or non-existent. This is mainly a result of both the need for individual countries to retain sovereignty over the fish resources in their territorial waters and also the weakness, or absence, of organizations that are active in developing consistent management approaches for the region. As noted earlier, such a regional focus for management is potentially important in the region because of the shared nature of many of the fish stocks.

The policy framework in place within the region is more often than not development orientated, despite many fish stocks being considered overexploited. Management based on principles of ecologically sustainable development (ESD), or some other recognition of the need for long-term sustainable management of exploited fish stocks, is rare in the region and is only mentioned as a management objective in the fisheries legislation of Djibouti and Eritrea. As an example of this development-orientated approach, the objectives of fisheries management in Oman are listed as:

- development and modernization of the fisheries sector;
- development of fisheries exports;
- enhancement of economic diversification of the country through fisheries development;
- development of fisheries-related industries;
- development of aquaculture projects;
- enhancement of the future production and value of Oman's coastal fisheries and the well-being of the people and coastal communities.

In India, there is an additional complication in overall policy objectives, resulting from overlapping legislation at the Union (i.e. national) level and at the state level, as well as various pieces of legislation at both levels impacting on fisheries management and development.¹¹ However, much of the legislation is clearly development oriented and it is only the Marine Products Export Development Authority Act of 1972 that mentions sustainable management and conservation of deep sea and offshore fish resources.

The reason for the lack of a sustainable development orientation to policy framework in the region¹² is almost certainly related to the age of the underlying legislation. Much of the basic fisheries legislation is relatively old¹³ and it is the newer legislation, such as that in Djibouti (2002), Eritrea (1998) and the Sudan's twenty-five years Fisheries Strategy (2002), that incorporates such sustainable development principles. In most countries with older legislation, the legislation is often seen as a basis for the **administration** of fisheries rather than a policy framework for the long-term **management** of the fisheries sector. As an administrative framework, older legislation can, and is, periodically modified to update administrative requirements and procedures but the basic philosophy and policy framework under which fisheries are managed are not changed by such modifications.

¹¹ There are, however, several co-ordination mechanisms in place between Union and State authorities.

¹² The lack of a sustainable development policy framework does not imply that fisheries are not managed, in practice, for long-term sustainability. For example, the Islamic Republic of Iran has been active in reducing capacity in its demersal trawl fleet through a "buy-back" scheme. However, such decisions are often not taken within an overall context of sustainable management, resulting in management intervention only when a crisis looms.

¹³ Much of the legislation in the region dates from the 1980s (Table 2 for details) with Jordan's basic fisheries law being from 1941 and Iran's 1993.

An important step forward for most of the countries in the region would therefore be to undertake a review of their basic fisheries laws and redraft them as the basis for the management, as well as the administration, of fisheries on a long-term sustainable basis.

The fisheries in the region are dominated by artisanal fisheries¹⁴ and most governments have policies in place to upgrade this sector.¹⁵ Such encouragement of the artisanal sector includes direct and indirect subsidies, which are widespread in the region. For example, India has five separate, centrally-funded programmes to develop coastal marine fisheries:

- assistance to fishers for the motorization of traditional craft (direct subsidies);
- introduction of plywood and intermediate craft;
- reimbursement of central excise duty on HSD oil¹⁶ used in mechanized vessels;
- assistance to maritime state governments to enforce fisheries regulations (providing patrol boats); and
- resource enhancement through creation of artificial reefs and subsidization of mariculture.

It must be noted, however, that the scope of these programmes is subject to budget constraints and may not necessarily represent significantly large programmes or programmes that are undertaken on a continuous basis.

In addition to this, the Indian Government supports the construction of major and minor fishing ports, bearing all the costs of major developments and entering into cost-sharing arrangements with state governments for smaller projects.

Similarly, most of the Gulf countries provide extensive subsidies to their artisanal fisheries and the extent of the subsidies is usually related to the government's capacity to continue these extensive subsidization programmes. The more wealthy Gulf countries such as Kuwait, Saudi Arabia and the United Arab Emirates offer generous support to their artisanal (and sometimes industrial) fisheries¹⁷ whereas the support offered by other, less wealthy countries is more modest.

REGIONAL LEGISLATIVE FRAMEWORK

All national fisheries legislation in the region, with the exception of that in Jordan, nominates a management agency that is specifically responsible for the management and development of marine fisheries. The agencies in all countries are either specific fisheries ministries or identified departments within a larger organization, usually an Agriculture ministry. In no instance is fisheries management linked to an environment ministry, which is consistent with the development rather than the preservation focus throughout the region. For a similar reason, environmental legislation generally impinges only marginally on fisheries legislation and, when it does, it is for specific purposes or areas such as marine parks. Formal coordination between environmental and fisheries agencies is not common, although in many countries¹⁸ ad hoc or

¹⁴ More than 80 percent of the catch in the eighteen countries considered in this review is taken by the artisanal sector (e.g. by small, national owner-operated vessels selling to the local market).

¹⁵ Some countries, such as Djibouti, specifically prohibit industrial fisheries and allocate fisheries resources to local, artisanal fishers. Some of the Gulf countries, such as the United Arab Emirates, view the artisanal fisheries as an important part of their cultural heritage and support their continuation for this reason.

¹⁶ High-speed diesel oil used for fuel.

¹⁷ These subsidies include the provision of free or subsidized services such as engine supply and maintenance (e.g. Oman and United Arab Emirates) as well as direct cash payments as in Kuwait and Saudi Arabia. The impact of these subsidies is, as expected, to allow continued exploitation of stocks to a point that would otherwise be uneconomic. For example, in Kuwait, artisanal fishers have been provided with cash payments in compensation for poor catches.

¹⁸ For example, Bahrain.

TABLE 2

Year in which current basic fisheries legislation was introduced

Country	Year of legislation
Bahrain	1981
Djibouti	2002
Egypt (Red Sea coast)	1983
Eritrea	1998
India (west coast)	Varies. Some state legislation is new.
Iraq	1976
Islamic Republic of Iran	1993
Israel (Red Sea coast)	1937 (amended 2000)
Jordan	1943
Kuwait	1980
Oman	1981
Pakistan	1975 (amended 1993)
Qatar	1983
Saudi Arabia	1988
Somalia	1985
Sudan	1937 (by-laws 1975)
United Arab Emirates	1999
Yemen	1991 (amended 1997)

permanent marine environment committees often include a member from the fisheries management agency.¹⁹

As noted above, the age of national fisheries legislation is one of the key factors in determining overall national policy framework, with older legislation having a more development focus while newer legislation often incorporates concepts such as sustainable development. Because the age of the legislation is so critical, Table 2 provides data on the year in which the basic fisheries legislation for each country was introduced.

In total, national fisheries legislation in 12 of the 18 countries was introduced prior to the 1992 Rio Declaration on Environment and Development, which established the principles of ecologically sustainable development (ESD). Only four of the countries considered have legislation that postdates the Rio Declaration. Of these four countries, only two have legislation that incorporates the principles of ESD.

Only the legislation of Djibouti and Eritrea specifically include provisions for the preparation of management plans for fisheries²⁰ and also for consultative mechanisms to involve stakeholders²¹ in the preparation and review of these management plans. Management plans are therefore a rarity in the region and, at present (2004) no fisheries-specific management plans are in place for any major fishery in the region.²² Such management plans would, of course, assist greatly in the management of shared stocks in particular, of which there are many in the region.

¹⁹ However, environment agency representation on fisheries committees is rare. Even in Eritrea, which has extensive legislative requirements for stakeholder consultation, the Fisheries Advisory Council does not include an environmental representative.

²⁰ It is worth noting that, although the legislation of the United Arab Emirates is recent (1999), it does not include ESD principles nor the requirement to prepare management plans or consult with stakeholders and is, like older legislation of the Gulf area, very much development orientated.

²¹ Many other countries, such as India and Oman, have mechanisms for consultations with stakeholders on fisheries management issues, often based on traditional consultative arrangements, but these mechanisms are not specifically legislated for but, rather, are the methods that management agencies use to involve stakeholder groups. The problem with such informal administrative arrangements is that they are subject to change depending on a number of factors, including attitudes by the management agency, the political power of the stakeholder groups and the issues being discussed.

²² A Fisheries Sector Management and Development Action Plan in Eritrea was under development in 2004.

At-sea fisheries enforcement is rarely undertaken by the management agency themselves²³ in countries in the region. Instead, arrangements are in place for either the coast guard or the navy (or both) to enforce fisheries legislation, often as part of their regular patrol duties. The coordination between the management agency and the enforcement agency is rarely close or formalized, which is not surprising considering the lack of management plans and therefore the lack of a common policy framework within which both management and enforcement agencies can work. More importantly, the funding for fisheries enforcement often comes directly from the enforcement agency's budget rather than the management agency's.²⁴ In contrast, the management agencies in all countries are responsible for and undertake²⁵ monitoring activities at landing sites and in markets with these activities often being combined with statistics collection activities.

STATE OF FISHERIES IN THE REGION

The fisheries of the region are dominated by small-scale, artisanal fisheries with over 80 percent of the 2002 landings originating from these fisheries. While industrial-scale fisheries are important in countries such as India, Iran, Oman, Pakistan and Yemen, other countries (particularly the Gulf countries) have seen their industrial fisheries reduced either because of government policy (e.g. in Djibouti, the United Arab Emirates and Yemen) or because declining stocks²⁶ have made such fisheries uneconomic (e.g. in Bahrain and Qatar).

The main commercial species in the region are shown in Table 3, together with the countries in which they are fished and their probable (or actual) status. The assessment of the status of the stocks is based on (often scarce) analyses done on a national basis and amalgamated across the region. The assessments are therefore the author's opinion, based on published data, the details of which can be found in individual country reviews. Although the same species might be fished in a number of countries, this does not necessarily imply that the stocks of these species in different countries are interdependent. The extent of stock interdependence is simply not known for most species in the region.

During the ten-year period 1992–2002, total demersal fish landings (for the species shown in Table 3) have decreased by 4.8 percent, small pelagic landings have increased by 18.8 percent and large pelagic landings have increased by 21.8 percent. This is an interesting development, as FAO concluded recently, that large pelagic resources were among the few stocks in the region that were underexploited (FAO, 1997). Since that time, exploitation rates and landings of these species have increased at a faster rate than other species groups.²⁷

Despite the decline in catches of demersal species during the past decade, these species remain the most important group in regional fish landings. These species are taken by many of the artisanal fisheries in the region and, as shown in Table 3, are widespread throughout all countries in the region. In contrast, the significant fisheries for small pelagic species are often confined to a few countries and are based on a small number of species, particularly those off the west coast of India and Pakistan, including

²³ No country in the region has enforcement capabilities attached to its management agency, with the exception of Kuwait where the Public Authority for Agriculture and Fisheries Resources (PAAFR) has its own vessels that undertake fisheries enforcement activities.

²⁴ Oman has arrangements whereby the coast guard and other enforcement agencies can, theoretically, charge the Directorate General of Fisheries Resources for enforcement services, but this is not often done, presumably because of the difficulty in separating fisheries enforcement activities from other types of enforcement activity.

²⁵ To a greater or lesser degree, depending on the country.

²⁶ Particularly the industrial shrimp fisheries of the Gulf.

²⁷ This is the result of the general increase in importance of offshore fisheries, particularly in India.

TABLE 3
The major marine fisheries of the Northwest Indian Ocean countries

Species	Approximate total landings (2002, tonnes)	Countries in which fished	Probable/actual status
Demersal species			
Emperor	52 800	Bahrain, Egypt, Eritrea, Jordan, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, United Arab Emirates, Yemen	Overexploited in all areas except Eritrea
Groupers	58 000	Bahrain, Djibouti, Egypt, Eritrea, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, United Arab Emirates, Yemen	Overexploited in Gulf states and Yemen. Perhaps under-exploited in Djibouti and Eritrea
Croakers	264 500	India, Kuwait, Oman, Pakistan	Overexploited in all areas
Sea catfish	86 700	Eritrea, India, Oman, Pakistan, Qatar, Saudi Arabia, United Arab Emirates, Yemen	No data
Other marine fish, mainly demersal	590 000	All countries	Varies
Subtotal	1 052 000		
Small pelagic species			
Anchovies	80 000	India (92% of total), Oman, Pakistan	Uncertain but probably fully exploited
Bombay-duck	100 400	India (99% of total), Pakistan	Uncertain, but probably fully exploited. Landings have stabilized in recent years
Pomphret	27 700	India, Oman, Pakistan, Kuwait	Overexploited in all areas
Indian mackerel	49 600	India (85% of total), Oman, Egypt, Eritrea, Saudi Arabia, United Arab Emirates, Yemen	Uncertain but probably fully exploited although abundance influenced significantly by oceanographic factors
Indian oil sardine	389 600	India (85% of total), Oman, Pakistan, United Arab Emirates	Uncertain and abundance influenced significantly by oceanographic factors. There is evidence of an inverse relationship in abundance with Indian mackerel but the mechanism for this is not known
Other small pelagic species	97 000	Most countries, but particularly India, Oman, Pakistan, Saudi Arabia, United Arab Emirates	Varies but small pelagic species are considered under-exploited in the Gulf of Aden and Sea of Oman
Subtotal	744 300		
Large pelagic species			
Longtail tuna	45 700	Iran (72% of total), Oman, Pakistan, Saudi Arabia, United Arab Emirates, Yemen	Probably fully exploited throughout its range
Narrow barred Spanish mackerel	66 800	Bahrain, Egypt, Eritrea, India, Islamic Republic of Iran, Israel, Jordan, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Sudan, United Arab Emirates, Yemen	Now considered fully or overexploited in all areas
Sharks	56 300	Egypt, India, Islamic Republic of Iran, Oman, Saudi Arabia, Sudan, United Arab Emirates, Yemen	No data
Skipjack tuna	53 200	India, Islamic Republic of Iran, Jordan, Oman, Pakistan, Yemen	Considered to have potential for further development
Yellowfin tuna	35 000	India, Islamic Republic of Iran, Jordan, Oman, Pakistan, Yemen	Considered to have potential for further development
Subtotal	257 000		
Other major species			
Cephalopods	82 300	India, Islamic Republic of Iran, Somalia	Fully or overexploited in all areas
Penaeid shrimp species	222 000 (including 6 000 of <i>Metapenaeus</i> spp)	Bahrain, India, Iraq, Islamic Republic of Iran, Kuwait, Pakistan, Qatar, Saudi Arabia, Yemen	Overexploited in all areas.
Total of major species	2 357 600		
Percent of western Indian Ocean landings	73.8%		

Source: FAO, 2004a.

the Arabian Sea and Gulf of Oman. Such areas correspond to major areas of upwelling. Some of these species (e.g. Indian mackerel) have suffered declines in landings over the past decade while other fisheries, such as for Indian oil sardine, have developed to take their place.

Demersal species are fully or overexploited in many countries in the region, with the possible exceptions of Djibouti and Eritrea. In the Arabian, or Persian, Gulf, the catch of some major demersal finfish species (such as grouper) is in decline in all countries. Overexploitation may be a contributing factor in this decline (as indicated by fish length or age distributions) as well as changing environmental conditions brought about by coastal development. Similarly, pelagic fisheries in the Gulf (particularly for kingfish, *Scomberomorus commerson*) are in decline with overexploitation being the most likely cause.

High-value species are particularly overexploited throughout the region. In Oman, there have been concerns for many years regarding the status of the stocks of the rock lobster and abalone stocks and, to a lesser extent, the demersal resources, particularly cuttlefish. Rock lobster landings have decreased substantially to approximately 350 tonnes in 2001 from levels around 2 000 tonnes per annum in the late 1980s. This dramatic decline in landings paralleled similar major declines in landings of this species in Yemen (including the Socotra Islands) at the same time. This collapse was attributed to the widespread use of nets rather than traps to capture lobsters (resulting in many undersized and egg-bearing animals being taken) as well as increasing and unregulated fishing effort. Illegal entry of unregistered and unlicensed boats put further pressure on the stocks. In addition, lobster stocks on the west coast of India and Somalia have also suffered major decreases in landings over the past ten years as a result of overexploitation.

Shrimp fisheries are important, high-value fisheries throughout the region (see Table 3) and are fished by both artisanal and industrial vessels. Although total landings of all species remained at around 270 000–300 000 tonnes²⁸ per annum until about 1998, these landings were only maintained in most areas²⁹ by substantial increases in fishing effort. Since 1998, total landings have fallen each year until 2002, with these reductions being attributable to overexploitation in all major shrimp fishing countries, often exacerbated by the declining health of coastal marine environments. In the Gulf, shrimp resources are overexploited in Bahrain, the Islamic Republic of Iran, Kuwait, Qatar and Saudi Arabia, with both Bahrain and Qatar having suspended their industrial shrimp fishing activities. In the Red Sea, the shrimp fishery has been the subject of significant management attention and closed seasons, gear restrictions and closed areas are in place in Saudi Arabia and Yemen. However, the resources may be being exploited beyond the maximum sustainable yield estimated previously.

There appear to be few stocks that remain underexploited. Small pelagic resources in the Gulf of Aden (off the coasts of Djibouti and Eritrea) have been identified as being capable of additional exploitation (Kunzel, Darar and Vakily, 1996, Grofit, 1971, Ghebremariam and Ghebretensae, 2000) and there may be some additional potential in large pelagic (particularly tuna) resources in the Gulf of Oman and Arabian Sea, although fishing effort in these offshore fisheries has increased in the past decade as have landings.

The most important large resource in the region that is not currently exploited to any great extent is the mesopelagic species of the Gulf of Oman. The biomass of these

²⁸ The majority of these catches come from the west coast of India and Pakistan, although the Islamic Republic of Iran, Saudi Arabia and other Gulf countries are also important producers.

²⁹ See individual country reviews for details. Major increases in fishing capacity have occurred in India, Pakistan (Raza and Khan, 2003), Saudi Arabia and other countries, most often as a result of increases in fishing effort by the artisanal sector.

mesopelagic fish (lanternfish) was estimated (Vidal-Junemann, 1981, Scharfe, 1983 and subsequent surveys by the R/V *Rastrelliger* in 1989–1990) to be 4 490 000 tonnes, (4 000 000 tonnes in Gulf of Oman and 490 000 tonnes in the Arabian Sea). Based on various assumptions, it has been estimated that the potential annual yield of the lanternfish stock could approach that of its standing stock biomass.

Although there have been attempts at capturing and processing the large stocks of deepwater lanternfish, this has not been successful and, to date, no commercial landings have been made. In 2003, however, the Iranian fishing industry established a fishery for lanternfish in Iranian waters in the Gulf of Oman and has successfully processed these into fish meal. Such developments may open this apparently large resource to exploitation.

A critical issue for the region in assessing the status of marine fish stocks is the lack of primary data and the lack of analyses upon which to base meaningful stock assessments.³⁰ Many countries (such as Eritrea, Israel, Jordan, Somalia, the Sudan, etc.) have either no information or old information on the status of fish stocks in their areas upon which to base management plans, while others (e.g. Djibouti, India, Oman, Yemen, etc.) have more recent analyses, although such analyses are usually made difficult because of the shared nature of the stocks in question (Sanders and Morgan, 1989). Of particular concern is the degradation, rather than improvement, in the information available upon which to base stock assessments in some countries such as Kuwait and Oman. There is an urgent need not only to upgrade the information base on exploited marine fisheries resources in the region but also to use this information in undertaking assessments of the major fish stocks, on a regional basis if appropriate. Without such information, it is unlikely that the management of marine stocks in the region will improve.

REGIONAL MANAGEMENT ACTIVITY

As noted above, there is no regional management of any stock although many stocks are undoubtedly shared between countries in the region. A regional fisheries commission (RECOFI) was formed in 1999 and brings together the countries of the Gulf, including the Islamic Republic of Iran and Oman. However, to date, RECOFI has not implemented any regional management initiatives. The other countries of the region, particularly those bordering the Red Sea and Gulf of Aden have no regional management organization to coordinate management arrangements, although the Commission for the Protection of the Marine Environment of the Red Sea and Gulf of Aden (PERSGA) includes fisheries issues in its considerations, but from an environmental protection, not a management, viewpoint.

Countries within the region therefore manage marine fisheries within their territorial waters at a national level, despite the obvious shared nature of many stocks. In undertaking such management, the extensive artisanal fisheries of the region are generally managed to a lesser extent than the industrial fisheries, which often have limited entry provisions and other management conditions applied to them. Limited entry provisions and the control of fishing capacity within the artisanal sector is rare in the region with only Saudi Arabia having addressed this issue, albeit not entirely successfully.

The tools used for managing marine fisheries at the national level vary from one country to the next, although the development-orientated policies of many countries generally result in tools that encourage exploitation and expansion of the sector (particularly the artisanal sector) rather than imposing restrictions on their activities. Such encouragement includes the widespread use of direct and

³⁰ The region is characterized, according to FAO (2002), as being the most data deficient area in the world, with most stocks not having undergone any rigorous assessment.

indirect subsidies, particularly in those richer countries that can afford an extensive subsidization scheme.

In India, the Ministry of Environment and Forests functions as the national focal point for a number of Multilateral Environmental Agreements (MEAs) such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 (CITES) and the Convention on Biological Diversity, 1992 (CBD). The Ministry is also gradually introducing measures for the protection and management of marine resources (Matthew, 2003). This is in contrast with the production and growth-oriented policies pursued by the Ministry of Agriculture, other Union ministries and State departments and agencies dealing directly with fisheries. This symbolizes a step forward in terms of legislating for the sustainable management of fisheries resources.

Table 4 provides details on the general management tools used by each country in the region and shows both the differences in management activity between artisanal and industrial fisheries and also the generally poorly developed management activities for managing fishing capacity in the region.

In Table 4, the lack of output management in the region is apparent with virtually all fisheries (where they are managed) being managed by input controls.³¹ Fishing licences are required by both artisanal and industrial fishing vessels and fishers in almost all countries, and the licence fees comprise the greatest (and often only) income from the fisheries sector to support fisheries management.

The effectiveness of enforcement of management regulations in the region is a major issue and is generally very weak. As a result, illegal fishing is common throughout the region. Enforcement is most often performed by agencies other than the fisheries management agency³² and usually by national coast guards, police or the navy. Enforcement of fisheries regulations is therefore most usually undertaken as part of other marine patrol duties and, as a result, fisheries are not often seen as a focus of attention. Some countries, such as the Islamic Republic of Iran and Oman have introduced vessel monitoring system technology (VMS) to assist in monitoring the activities of industrial fisheries (FAO, 2000). However, securing prosecution using this technology remains problematic because of the nature of the fisheries legislation and the lack of specific legislative acceptance of VMS information as evidence.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

In no country in the region are the participants in the fisheries sector required to pay the full cost of management, research or enforcement for the sector and the concept of “the user pays” is unknown in the area. Governments receive revenues from marine fishing activities from two main sources: (a) licence fees paid by fishers for vessels and fishers’ licences; and (b) royalty payments for foreign industrial fishing where such fisheries exist.³³

Licence fee revenues are generally small and neither reflect nor are related to the actual cost of the management of fisheries. In some countries, these licence fees are not paid to the fisheries management authority but to general government revenues (Ministry of Finance or similar), and even where they are paid to the management agency, they do not constitute a major source of income for the management authority’s total annual revenue. Royalties, however, where they exist, can be substantial. In countries such as Eritrea that are pursuing a policy of developing their industrial fisheries, the revenues from this source are increasing – in Eritrea in 2003, royalties reached US\$ 3 million

³¹ Although Oman allocates quotas for demersal and pelagic species to the industrial sector, these quotas are far in excess of actual landings and are therefore not an effective management tool.

³² With the exception of Kuwait, where the management agency has an enforcement capability.

³³ In addition, in Oman, the management authority receives a proportion of the fines levied by the courts for breaches of fisheries regulations.

TABLE 4
Management activity for the major artisanal and industrial fisheries in the countries of the region

Country	Limited entry or other capacity controls?			Catch Restrictions (quotas, etc.)?			Time restrictions (seasons, etc.)?			Spatial restrictions (closed areas)?			Gear restrictions (mesh size or gear type)?		
	Artisanal	Industrial	Artisanal	Artisanal	Industrial	Artisanal	Artisanal	Industrial	Artisanal	Artisanal	Industrial	Artisanal	Artisanal	Industrial	Artisanal
Bahrain	No	n/a	No	No	n/a	No ¹	Yes	n/a	Yes	n/a	n/a	Yes	Yes	n/a	n/a
Djibouti	No	n/a	No	No	n/a	No	No	n/a	No	n/a	n/a	Yes	Yes	n/a	n/a
Egypt (Red Sea coast)	No	No	No	No	No	No	Yes ⁵	Yes ⁵	No	No	No	No	No	Yes	Yes
Eritrea	No	Yes	No	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes
India (west coast)	No	Some	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Iraq	No	n/a	No	No	n/a	No	No	n/a	No	No	n/a	Yes	Yes	n/a	n/a
Islamic Republic of Iran	No	Yes	No	No	No	No ¹	Yes	No ¹	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Israel (Red Sea coast)	No	n/a	No	No	n/a	No	No	n/a	No	n/a	n/a	No	No	n/a	n/a
Jordan	No	n/a	No	No	n/a	No	No	n/a	No	n/a	n/a	No	No	n/a	n/a
Kuwait	No	Yes	No	No	No	No ¹	Yes	Yes	No ¹	Yes	Yes	Yes	Yes	Yes	Yes
Oman	No	Yes	No	No	Yes	No ²	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Pakistan	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes
Qatar	No	n/a	No	No	n/a	No	n/a	n/a	Yes	Yes	Yes	Yes	Yes	n/a	n/a
Saudi Arabia	Yes	Yes	Yes	No	No	No ¹	Yes	No ¹	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Somalia	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No	Yes	Yes
Sudan	No	n/a	No	No	n/a	No ¹	No ⁶	n/a	No	n/a	n/a	Yes	Yes	n/a	n/a
United Arab Emirates	No	n/a	No	No	n/a	No ³	No	n/a	No	n/a	n/a	Yes	Yes	n/a	n/a
Yemen	No	Yes	No	No	No	No ⁴	No	No ¹	No	Yes	Yes	No ⁴	No ⁴	Yes	Yes

Note: n/a = not available

1. Except for cuttlefish taken by the industrial fleet
2. Except for lobster and abalone where a closed season is in place but not well enforced
3. Except for the gillnet fishery for kingfish, where a closed season is in place but not well enforced
4. Except for shrimp
5. Only for the demersal trawl fishery. There are no temporal restrictions on the purse seine fishery
6. Except for Saganab atoll, which is closed to fishing

TABLE 5

Status of UNCLOS, UN Fish Stocks Agreement and UN Compliance Agreement

Country	UNCLOS	Fish Stocks Agreement	Compliance Agreement
Bahrain	1985	No	No
Djibouti	1991	No	No
Egypt (Red Sea coast)	1983	1995	No
Eritrea	No	No	No
India (west coast)	1995	2003	No
Iraq	1985	No	No
Islamic Republic of Iran	1982	1998	No
Israel (Red Sea coast)	No	No	No
Jordan	1995	No	No
Kuwait	1986	No	No
Oman	1989	No	No
Pakistan	1997	No	No
Qatar	2002	No	No
Saudi Arabia	1996	No	No
Somalia	1989	No	No
Sudan	1985	No	No
United Arab Emirates	No	No	No
Yemen	1987	No	No

per annum. In contrast, in Oman, royalty payments have been decreasing as industrial landings have decreased and the species mix of landings change,³⁴ and this has led to a decline in royalties of over 61 percent since 1995 and 15 percent between 1999 and 2000 alone. At the present time, these royalties are approximately US\$ 1.01 million per annum.

Despite the importance in some countries of royalty payments from foreign industrial fishing, the greatest part (and often the sole source) of revenue to the fisheries management agency in all countries is from annual government budget allocations. These, of course, are subject to change according to national priorities, and in many countries (for example, Bahrain, Egypt, Qatar, Saudi Arabia, the United Arab Emirates and others), there has been a declining trend in funding to the fisheries management agency for marine fisheries management although activities such as aquaculture development often receive substantial funding.

Because of the lack of any “user-pays” principle and there being no explicit relation between the costs of required management and revenues, fisheries management agencies invariably adjust their management and supporting activities to the level of annual government appropriations. This, in recent years, has been sufficient to maintain basic management administration of licensing, monitoring, enforcement and research in almost all countries,³⁵ although more ambitious programmes (particularly research) often cannot be funded nationally. In some countries (e.g. Djibouti, Eritrea, and Yemen) international and bilateral aid has assisted in undertaking research and capacity-building projects that otherwise could not be funded by the national fisheries management agency and that, in these countries, are important in providing basic information and capabilities upon which to base management decisions.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Most countries have signed or ratified the UN Convention on the Law of the Sea (UNCLOS) although ratification of the UN Fish Stocks Agreement or the UN Compliance Agreement is less common. Table 5 provides a summary of the status of

³⁴ Oman charges a royalty per kg of fish landed according to species. As the reported landings of higher value species (such as cuttlefish) have declined, royalties have declined at a greater rate than total landings.

³⁵ Iraq is an exception, where the capacity to provide even basic management services has declined severely since 1991.

ratification of each of these global fisheries mandates. Most countries bordering the Red Sea and Gulf of Aden³⁶ have also signed the Convention on the Protection of the Marine Environment of the Red Sea and Gulf of Aden (PERGSA).

Individual countries' performance on implementing International Programmes of Action (IPOAs) has varied. India, for example, has been active in developing national plans of action to address a number of issues. Ten species of endangered shark have come under the ambit of the Indian Wildlife Protection Act of 1972, and research programmes are being directed at this particular resource.³⁷ A subgroup has been constituted to assess fishing capacity, and the government intends to have capacity measured by 2005. In addition to this, the new deep-sea policy is mentioned in the capacity study, and is expected to address these issues.

The extent of illegal, unreported and unregulated (IUU) fishing and related problems are also being assessed by a subgroup, which will suggest a set of appropriate measures to be taken based on FAO recommendations (FAO, 2001). The dual registration and flag hopping for foreign vessels registered under Indian companies and seabird impact (which is considered a minor problem in Indian fisheries) have not yet been addressed.

In Oman, there are regulations in place to address the finning of sharks and their utilization.

Beyond these two country examples, however, there have been no other regional or national initiatives to address managing fishing capacity, IUU fishing, shark management and seabird bycatch in longline fisheries. The reason often cited is that the issues are not considered important in the countries of the region. This is probably the case with some issues such as seabird bycatch by longlines but managing fishing capacity, IUU fishing and shark management have direct relevance in the region. The lack of action on these international fisheries initiatives is again a result of the development-orientated nature of fisheries policy of countries in the region and the absence or early stage of development of effective regional fisheries bodies. As a result, no national or regional plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

The Regional Fisheries Commission (RECOFI) was formed in 1999 and brings together in annual meetings Bahrain, Kuwait, Iraq, the Islamic Republic of Iran, Oman, Qatar, Saudi Arabia and the United Arab Emirates. All countries, with the exception of Iraq, participate fully in the activities of RECOFI and its various working groups. However, RECOFI has yet to implement any regional fisheries management initiatives.

No other regional fisheries bodies exist that bring together the countries of the region. Furthermore, India, which is by far the major fish producer of the region, is not represented in any regional fisheries body. As noted earlier, PERGSA addresses fisheries issues within the Red Sea and Gulf of Aden region but with a focus on regional marine environmental issues rather than regional fisheries management.

SUMMARY AND CONCLUSIONS

Fisheries management in the region is characterized by the following four factors:

- the almost total absence of comprehensive stock assessments of major exploited marine resources upon which to base management decisions, combined with a generally poor statistical database on landings (and their composition) and fishing effort;
- the regional and shared nature of many of the fish stocks that is in contrast to the poorly developed institutions for regional management;

³⁶ Signatories to PERGSA are Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan and Yemen.

³⁷ Source: Government of India.

- the development orientation of national fisheries legislation and policy³⁸ in most countries despite the apparent over- or fully exploited status of many fish stocks; and
- a general lack of success at the regional and national level in measuring and controlling fishing capacity, particularly in the large and important artisanal sector.

The combination of these four factors has resulted in increasing pressure on exploited stocks. In 1997, FAO concluded that large pelagic resources were among the few stocks in the region that were underexploited and it is these stocks that have shown the greatest increase in landings since that time. Stocks that were considered overexploited in 1997, such as shrimp stocks in a number of countries, the rock lobster stocks of Oman/Somalia/Yemen and many of the demersal species (particularly grouper in the Gulf) taken by fish traps, remain overexploited and there has not been any instance of a stock rehabilitation programme being implemented.³⁹

The pressure on exploited stocks is further aggravated by widespread illegal fishing, ranging from illegal foreign fishing in the waters of Eritrea, Somalia and other countries to local, national illegal fishing such as the rock lobster stocks of Oman and Yemen. Fisheries enforcement, particularly of local artisanal fisheries in the region is weak and only three countries utilize VMS as a technological aid to assist in minimizing illegal fishing.

In many countries in the region, the nature of both legislation and the activities of fisheries agencies is one of administration (through licensing and administering subsidization programmes, etc.) rather than management in accordance with a well-defined long-term strategic plan to ensure sustainability of the resource.⁴⁰ Despite being administered, many of the fisheries in the region are therefore essentially unregulated in that fishing capacity is not controlled, although gear restrictions are common. In the absence of a long-term, strategic approach to management for stock sustainability, it is therefore not surprising that fisheries management plans are almost unknown in the region.

However, some progress is being made. In addition to the newer legislation of Eritrea and Djibouti that emphasizes management according to the principles of ecologically sustainable development, Yemen is also in the process of reforming its approach to fisheries management and is investing in better information and research bases. Sudan is basing its fisheries management on a 25-year-strategic plan while Oman, the United Arab Emirates and other countries have established a planning framework (often five years) for fisheries. These latter plans, however, remain development orientated and do not take into account the issues of managing for sustainability and the urgent need to measure and control fishing capacity.

The development of strong regional fisheries commissions would be a major step forward in both adopting the necessary regional management of the many shared stocks and also in moving towards a more strategic approach to fisheries management based on good information and within a framework of long-term sustainable stock management.

³⁸ This includes extensive use of direct and indirect subsidies in the region.

³⁹ The Islamic Republic of Iran has, however, implemented a capacity reduction programme (through a government buy-back arrangement) for its industrial shrimp fleet in the Gulf in an attempt to rehabilitate its shrimp fishery.

⁴⁰ However, India has begun to address these issues and some countries such as Eritrea and Djibouti have introduced legislation to allow management for sustainability to be addressed.

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Subregional review: Southwest Indian Ocean

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INTRODUCTION

The southwestern Indian Ocean region, bordered to the west by the African continent, lies approximately between 0° and 45°S and extends to 80°E. The region is situated in the intertropical convergence zone, characterized by heavy rain and high seawater and air temperatures. It is bounded at its southern end by a transition zone between the Atlantic *Benguela* current and the Indian Ocean *Agulhas* current, a warm water system flowing from the Indian Ocean. The Atlantic *Benguela* current is part of one of the strongest wind-driven cold-water coastal upwelling systems in the world, leading to far greater productivity off the southwestern coast of Africa than is associated with the warm *Agulhas* current off the southeastern coast.

Four continental countries, Kenya, Mozambique, South Africa and United Republic of Tanzania and five islands and archipelagos, the Comoros, Madagascar, Maldives, Mauritius and Seychelles comprise the southwestern Indian Ocean region.¹ In this group, South African fisheries are atypical: taking advantage of the rich upwelling driven by the *Benguela* current, South African fisheries are turned principally towards the Atlantic and those that do exist in the southwestern Indian Ocean region are often an extension of the Atlantic coast fisheries into the intercurrent transition zone.

Marine landings of these nine countries (plus Mayotte and Réunion), shown in Table 1, represent a small percentage (over 10 percent) of total western Indian Ocean landings. Nevertheless, fishing is an important activity in this region, contributing to the crucial issues of food security and poverty alleviation. Some of the countries with the lowest gross income per capita are situated in this region, such as the Comoros, Kenya, Madagascar, Mozambique and the United Republic of Tanzania.²

The contribution of fisheries to livelihood and economy differs from one country to the next. In Maldives, fishing was the largest contributor to gross domestic product (GDP) until tourism overtook it in the mid-1980s. Despite the relative decline (from 16 to 9 percent) in the contribution of fishing to GDP because of the boom in tourism, the landed value from the major fisheries has increased substantially (from US\$24 million in 1989 to US\$40 million in 2003).³ However, in most countries, the contribution of the fishing sector to the GDP is below its potentiality. In Mauritius, the fishing industry as a whole contributes only around one percent to GDP, but the sector remains important for trade, with a positive trade balance for fishery products of US\$8.57 million in 2002, mainly due to the export of canned tuna.⁴ In 2002, over 30 percent of the value of the

¹ The main sources for this article are the country reviews in the Annex of this report, hereafter referred to as the State of the World Marine Capture Fisheries Management (SOWMCFM) Country Reviews, which include a formal review of fisheries frameworks and legal and management systems, supported by a detailed questionnaire on the three main fisheries by sector in each country. FAO Fishery Country Profiles and Information on Fisheries Management were also used to complete missing information when necessary (FAO, 2005a).

² World Bank, 2004.

³ From SOWMCFM Country Review for Maldives.

⁴ From SOWMCFM Country Review for Mauritius.

TABLE 1
Landings of marine fish in 1990, 2002 and 2003 in the southwestern Indian Ocean statistical area

Country	Marine landings (tonnes)		
	1990	2002	2003 (estimates)
Comoros	12 234	13 102	14 115
Kenya	9 819	6 991	7 095
Madagascar	72 800	114 219	112 731
Maldives	84 250	161 057	155 415
Mayotte (France)	1 600	4 815	2 541
Mauritius	14 098	10 706	11 136
Réunion (France)	911	2 872	2 844
Mozambique	32 919	24 306	78 129
Seychelles	5 427	62 622	85 060
South Africa (east coast)	1 853	1 586	2 117
United Republic of Tanzania	56 541	54 505	54 666
Subtotal	292 452	456 781	525 848
Total southwestern Indian Ocean	3 209 149	4 240 174	4 276 024
Percentage of southwestern Indian Ocean landings	9.1%	10.8%	12.3%
Percentage of global marine landings	0.4%	0.5%	0.6%

Source: FAO, 2005b.

Note: Catch data include marine mammals, crocodiles, corals, pearls, sponges and aquatic plants.

agricultural export of Madagascar, Maldives, Mauritius, Mozambique and Seychelles was fish. In Maldives and Seychelles over 40 percent of all exports was fish. In Seychelles, the fisheries sector is the first source of foreign exchange (Seychelles Fishing Authorities, 2001).⁵ In Madagascar, the fishing sector is also an important source of foreign exchange for the national economy but accounts for only 3.5 percent of the GDP.⁶

In all countries, fish plays an important role in the daily diet. Fish forms over 20 percent of total animal protein in the Comoros, Maldives, Mauritius, Mozambique and Seychelles. As an extreme example, Seychelles is ranked fifth in the world in terms of per capita consumption of fish, with an annual intake of around 65 kg per person. In Kenya and the United Republic of Tanzania, the situation is somewhat different because most fisheries are inland, in lakes such as Lake Victoria and Lake Tanganyika. Marine fish landings represent less than 5 percent of fish production in Kenya and between 10 and 20 percent in the United Republic of Tanzania.

There is a general trend towards the development of semi-industrial and industrial national fleets. However, the exploitation of stocks beyond the coastal zone by such fleets still remains, with the exception of South Africa, at a relatively low level even if certain of these fisheries are growing. Examples of such fisheries include the swordfish fishery off Mauritius and Seychelles, Mauritius' offshore banks fishery and the deep shrimp fishery off Madagascar and Mozambique.

Marine landings are still predominantly produced by artisanal fisheries operating within the coastal zone, which covers a great diversity of coastal habitats such as sandy beaches, estuaries, coral reefs, lagoons, wetlands, bays, mangroves and seagrass beds. Pressure on the coastal zone has been increasing, certainly over the past 20 years, as a result of population increase (Kenya, Madagascar, Mozambique and the United Republic of Tanzania), the development of international tourism (widespread) and the development of coastal aquaculture (Madagascar, Mozambique). Therefore, management of the coastal zone in the southwestern Indian Ocean is a major

⁵ In Seychelles, official figure put fisheries contribution to GDP at below 1%; however, as this estimate includes only the artisanal fisheries sector, this estimate is undervalued. The inclusion of the industrial fishery and other fisheries related activities would increase the overall contribution of this sector to above 15% (Payet, 2005).

⁶ From SOWMCFM Country Review for Madagascar.

TABLE 2
Year of introduction of current basic fisheries legislation in the southwestern Indian Ocean region

Country	Name of legislation	Year introduced
Comoros	Loi-cadre portant code des pêches et de l'aquaculture de l'Union des Comores	2004*
Kenya	Fisheries Act	1989
Madagascar	Ordonnance portant réglementation de la pêche et de l'aquaculture	1998
Maldives	Fisheries Law	1987
Mauritius	Fisheries and Marine Resources Act	1998
Mozambique	Fisheries Law	1990
	General Regulation of Maritime Fisheries	1996 (revised 2003)
Seychelles	Fisheries Regulations	1987 (amended 1998)
South Africa	Marine Living Resource Act	1998
United Republic of Tanzania	Fisheries Act	2003

Source: FAOLex, 2005c.

* Not yet in force (Talla et al., 2004)

issue for economic development, food security and the protection of habitats and vulnerable species.

This article discusses the major trends in the development of marine fishery management policy and practices over the last ten years within the subregion.

REGIONAL POLICY FRAMEWORK

During the last decade, the Comoros, Madagascar, Mauritius, Mozambique, Seychelles, South Africa and the United Republic of Tanzania have reformed or initiated programmes to reform their fisheries laws (Table 2). These reforms provided an opportunity to review the principles guiding the management of marine fisheries and its objectives. The general impression is that these principles, regardless of whether they were related to international agreements and objectives, were unequally and only partially integrated into the new laws.

The Mozambique fisheries law of 1990 did not integrate sustainable management principles and objectives and the gaps have only been partially filled by the new fishery regulation (1996, revised in 2003). Other countries, for instance the Comoros, Mauritius and Seychelles, undertook programmes with the technical assistance of FAO⁷ to formulate operational fisheries development strategies and to reform their laws appropriately. For example, the Mauritius ten-year fisheries development plan (1998) emphasizes the sustainable use of existing resources and the Fisheries and Marine Resource Act (1998) integrates guiding principles such as the “conservation, protection of fisheries and marine resources, and the protection of the marine ecosystem”. More precise objectives and references to the guiding principles (such as responsible fisheries) are cited on the Ministry of Agro Industry & Fisheries Internet Web site. South Africa's Marine Living Resource Act (1998), elaborated after the democratic election of 1994, integrates a number of principles internationally promoted such as sustainable development, the precautionary approach and ecosystem management (Box 1). However, since they focus mainly on the Atlantic Ocean, South African fisheries do not play a leading role in the subregion and are therefore not a typical example.

When management objectives or principles are not included in national Fisheries Laws, they can be extrapolated from other documents. Maldives' fishery objectives, for example, are presented in the National Development Plan and in Vision 2020, which set the political programme for the nation.⁸ In addition, the Malagasy constitution

⁷ In 1998 for Mauritius and Seychelles, in 2002 2004 for the Comoros.

⁸ From the SOWMCFM Country Review for Maldives.

BOX 1

Purpose, objectives and guiding principles of the South African Marine Living Resources Act (1998)

“to provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith”.

These principles and objectives of the Act are specified as:

- the need to achieve optimum utilization and ecologically sustainable development of marine living resources;
- the need to conserve marine living resources for both present and future generations;
- the need to apply precautionary approaches in respect of the management and development of marine living resources;
- the need to utilize marine living resources to achieve economic growth, human resource development, capacity building within fisheries and mariculture branches, employment creation and a sound ecological balance consistent with the development objectives of the national government;
- the need to protect the ecosystem as a whole, including species that are not targeted for exploitation;
- the need to preserve marine biodiversity;
- the need to minimize marine pollution;
- the need to achieve, to the extent practicable, a broad and accountable participation in the decision-making processes provided for in this Act;
- any relevant obligation of the national government or the Republic in terms of any international agreement or applicable rule of international law; and
- the need to restructure the fishing industry to address historical imbalances and to achieve equity within all branches of the fishing industry.

stipulates the need for rational exploitation of fishing resources in order to conserve them for future generations, while objectives are set out in the fishery management master plan.

A fishery policy framework for the southwestern Indian Ocean currently cannot be not explicitly defined because there is no set of common objectives and principles clearly stated within the region. In particular, principles guiding management are heterogeneous, although there are some similarities in the objectives identified in different countries.

Management objectives in the subregion are generally not sector specific and reflect national priorities. The southwestern Indian Ocean subregion contains some of the poorest countries in the world, such as the Comoros, Madagascar, Mozambique and the United Republic of Tanzania, where artisanal and traditional fisheries play an important role for food security and poverty alleviation. It is thus not surprising that management objectives are often development-orientated, for example poverty reduction, employment maximization and food security. For example, the Tanzanian National Fisheries Sector Policy and Strategy Statement identifies the following goals: poverty reduction, creation of employment opportunities, increased food security, increased economic growth and sound environmental practice.⁹ Similarly, the

⁹ From SOWMCFM Country Review for Tanzania.

objectives for the industrial and semi-industrial fisheries in Seychelles are to enhance the contribution to nutrition, to maximize work opportunities and foreign exchange earnings, to ensure stable development of the industry and to conserve marine resource so as to ensure long-term viability (Seychelles, 2005).

Similar objectives appear in the Protocol on Fisheries signed in 2002 within the framework of the Southern African Development Community (SADC), which includes five countries of the subregion: Mauritius, Mozambique, Seychelles,¹⁰ South Africa and the United Republic of Tanzania. This Protocol aims to promote responsible and sustainable use of the living aquatic resources and aquatic ecosystems in order to:

- promote and enhance food security and human health;
- safeguard the livelihood of fishing communities;
- generate economic opportunities for nationals in the region;
- ensure that future generations benefit from these renewable resources; and
- alleviate poverty with the ultimate objective of its eradication.

Overall, fisheries play, and are expected to continue to play, an important role in the subregion in terms of protein supply and employment, as well as in terms of fiscal receipts and foreign exchange. Fishery management objectives reflect these multiple goals. Whilst the reforms undertaken in each country have improved the political framework for fishery management in the region, the objectives remain potentially contradictory and there appears to be a general lack of prioritization. The distinction between management principles and management objectives is often unclear. Perhaps the most noteworthy feature is that many of the objectives are macroeconomic in nature (e.g. food security, employment, livelihoods and poverty alleviation). It is clear that no single sector can achieve these goals single-handedly but there appears to have been little debate as to how best the fisheries sector can contribute to the achievement of such macroeconomic goals.

Analysis of the possible routes through which fisheries can contribute to national social and economic development goals is urgently needed so that informed decisions can be made on the role that the sector, and perhaps even individual fisheries, should play. Otherwise the risk is that fisheries management objectives remain little more than a wishlist of desirable goals, and countries will fail to fully benefit from the natural wealth available to them in the form of fish resources.

REGIONAL LEGAL FRAMEWORK

All the countries in the subregion have agencies responsible for the management or development of marine fisheries. These agencies are either specific fisheries ministries or identified departments within a larger organization responsible for agriculture, tourism, or infrastructure/transportation, for example (see Table 3). Consistent with the importance attached to fisheries for employment, development and food security in the region, the fisheries departments generally are not linked to an environment ministry; the exception being South Africa and Seychelles.

It should be noted that institutional links between environment, tourism and fisheries have been developed in the region during the last decade through the line ministry (Seychelles, South Africa and the United Republic of Tanzania) or through the delegation of fisheries management responsibilities to natural parks (e.g. the marine parks of Bazaruto and Quirimbas in Mozambique, Kwazulu Natal park in South Africa and Mohéli Marine Reserve in the Comoros). This development is a recognition that the marine and coastal environment in this region provides a range of valuable services, including support for fisheries and for international tourism attracted both by living resources as well as habitat for classified endangered species such as turtle.

¹⁰ Seychelles has recently left the SADC.

TABLE 3
Ministry responsible for Fisheries Department

Comoros	Ministry of Development, Infrastructures, Mails and Telecommunications and International Transportation
Kenya	Ministry of Agriculture and Rural Development
Madagascar	Ministry of Agriculture, Aquaculture and Fisheries
Maldives	Ministry of Fisheries, Agriculture and Marine Resources
Mauritius	Ministry of Agro Industry & Fisheries
Mozambique	Ministry of Fisheries
Seychelles	Ministry of Environment and Natural Resources ¹
South Africa	Ministry of Environmental Affairs and Tourism
United Republic of Tanzania	Ministry of Natural Resources and Tourism

¹ Note: in the Seychelles, the Seychelles Fishing Authority is the executive arm of the Ministry of Environment and Natural Resources.

Environmental or related regulations have been introduced or reinforced in all countries since 1990. In South Africa, the Biodiversity Act (under development) includes the establishment of Marine Protected Areas (MPAs), which will impact on fisheries legislation. In Mozambique, regulations implemented after signing the Convention on International Trade in Endangered Species (CITES) led to modifications in fishing gear (e.g. the use of turtle excluder devices). In Madagascar, work is currently underway on the legal framework for integrated coastal zone management. However, most of these new laws or regulations still impinge only marginally on fisheries legislation, even if their impact is generally increasing.

Formal coordination between environment and fisheries agencies is not common, although it is developing in Maldives, South Africa and recently in Seychelles and the United Republic of Tanzania. For example, in Maldives, a member of the Ministry of Environment sits on the ad hoc Fisheries Advisory Board in order to ensure that provisions for the conservation of biological diversity, protected areas and natural reserves in line with the 2002 Environmental Protection and Conservation Act are taken into account in fisheries regulations.¹¹ Similarly, the Director of Fisheries in the United Republic of Tanzania is a member of the National Environmental Advisory Committee.

STATUS OF FISHERIES IN THE REGION

Marine fish resources in the southwestern Indian Ocean can be placed in two categories: tuna and non-tuna. The tuna species were not traditionally fished by the countries in the region, except for Maldives and smaller tuna for the Comoros. Non-tuna fishery resources are the main source of employment, subsistence and proteins for local populations of the region. For example, the Comoros, Maldives, Mauritius and Seychelles have populations that consume more than 20 kg per person per year (as high as 70 kg/caput in Seychelles and 160 kg/caput in Maldives). Fish forms over 20 percent of total animal protein in the Comoros, Mauritius, Mozambique, Seychelles and the United Republic of Tanzania. In Kenya and the United Republic of Tanzania, national fish consumption figures are dominated by the contribution of inland fisheries, but the contribution of marine production to communities along the maritime coast is nonetheless significant.

Most artisanal and industrial marine fisheries are multispecies. Broadly speaking, the same types of Indo-Pacific marine resources are harvested in the different countries, such as fish,¹² lobster, crab, shrimp, bivalves, octopus, sharks or reef species. Trevallies,

¹¹ From the SOWMCFM Country review for Maldives.

¹² Multispecies fish resources harvested by the artisanal or traditional fishery are often classified as "fish". The catch comprises species from a number of families such as Sparidae, Mugilidae, Apogonidae, Mullidae, Carangidae, Lujanids, etc. Production data are generally the result of estimates and neither the composition of landings by species nor the state of stocks are well documented in the region.

TABLE 4
The major marine fisheries of the southwestern Indian Ocean (SWIO) region

Species	Landings (2003, tonnes)	Countries in which fished	Probable Status
Marine fishes nei	152 060	all countries (Madagascar 54% of total, Mozambique 40% of total)	varies
Skipjack tuna	148 106	Maldives (73% of total), Comoros, Kenya, Mauritius and Seychelles	M?
Yellowfin tuna	64 979	Seychelles (53% of total), Comoros, Maldives, Mauritius, South Africa and United Republic of Tanzania	F?
Natantian decapods nei	15 418	Madagascar (86% of total), Comoros, Kenya, Mauritius, United Republic of Tanzania	F-O
Sardinellas nei	15 200	United Republic of Tanzania (93% of total) and Comoros	?
Sharks, rays, skates, etc. nei	13 844	Maldives (83% of total), Kenya, Mauritius, Seychelles, South Africa and United Republic of Tanzania	F-O?
Penaeus shrimps nei	13 566	Mozambique (99.9% of total) and South Africa	F
Narrow-barred Spanish mackerel	12 215	Madagascar (98% of total) and Kenya	?
Emperors nei	12 110	United Republic of Tanzania (62% of total), Kenya, Mauritius, Seychelles and South Africa	F-O
Bigeye tuna	7 374	Seychelles (96% of total), Comoros, Mauritius and South Africa	F?
Indian mackerel	5 206	United Republic of Tanzania (96% of total), Comoros and Seychelles	?
Total major species	460 078		
% of SWIO landings	89%		

Source of landings data: FAO, 2005b

Source of probable status: FAO, 2005a

Notes: catch data include marine mammals, crocodiles, corals, pearls, sponges and aquatic plants. nei = not elsewhere included; M = moderately exploited; F = fully exploited; O = overexploited

mackerel, sharks, small pelagic fish, lobsters and shrimps are the main identified transboundary resources.¹³ However, the definition of stocks is unclear in the region, so the understanding of interdependence between fisheries remains limited. The state of most resources is also poorly documented and information is often outdated as most biological data seem to have been collected in the 1970s and early 1980s (Table 4). Only the state of a few stocks with significant economic importance is assessed nationally on a more regular basis, for example shrimps in Madagascar, Mozambique and the United Republic of Tanzania. A catch assessment survey programme has been in place in the Seychelles since 1984, providing annual trends analyses for the artisanal fisheries.

Production is unevenly documented, especially landings from the artisanal and traditional fisheries for which even the total number of fishers and landing points is often not known with any precision, particularly in remote areas. As a result, production is often grossly estimated by category of fisheries, gear or location by country, making it difficult to provide a quantifiably accurate synthesis. Nonetheless, the region's fishing activities do have some significant subjective similarities.

Artisanal and traditional coastal fisheries¹⁴ using basic fishing gears (hooks, lines, harpoons, traps or nets) are predominant. They represent respectively 100 percent and 90 percent of the Comorian and Tanzanian landings, at least 75 percent of Mozambican landings¹⁵ and 73 percent of Malagasy landings. Once again, South Africa is an exception because the major part of its total landings is harvested by a semi-industrial midwater

¹³ From the Committee for the Development and Management of Fisheries in the Southwest Indian Ocean, 2000.

¹⁴ This distinction is commonly, but not systematically, made. Traditional fisheries generally include shore-based fishers and gatherers, fishers using non-motorized pirogues and fishers using pirogues with small outboard motors selling their catch to local markets.

¹⁵ A recent study of the three main artisanal fishing gears concluded that the current figure for artisanal landings (80 000 tonnes) is likely to be an underestimate (from SOWMCFM Country Review for Mozambique).

trawler fleet targeting horse mackerel and an industrial fleet targeting pilchard in both the Atlantic and Indian Oceans. Other exceptions include the Maldives, in which landings of tuna-like species dominate, and the Seychelles, where the traditional artisanal landings represent only 4.5 percent of all landings (SFA, 2003).

Artisanal and traditional fisheries are an important source of employment and the principal supplier of fish to local markets as illustrated by Madagascar where the 55 000 traditional fishers supply 95 percent of the fish for the local population.¹⁶ These fisheries occur in lagoons, bays and near-shore waters. One common feature is that they are generally considered to be fully- or overexploited, especially where they are found close to centres of population. Over the last ten years, the number of underexploited or stable fisheries in the coastal zone has tended to decline and such fisheries are now an exception.¹⁷ This change is due to the high density and low mobility of the artisanal and traditional fleets.

Fish aggregating devices (FADs) have been promoted in several countries of the region (the Comoros, Maldives, Mauritius, Seychelles and the United Republic of Tanzania) as a means of diversifying production and reducing or redirecting effort. Success has been mixed.¹⁸ The alternative solution, adopted or planned in some countries, is to develop a more heavily motorized artisanal fleet and a semi-industrial fleet to exploit new grounds further out in the EEZ, focusing particularly on tuna and tuna-like resources.

Semi-industrial fisheries target mainly shrimp, groundfish and deep-sea fish but also breams and snappers on offshore banks in Mauritius and Seychelles. Madagascar and Mozambique have developed the largest semi-industrial and industrial fleets targeting shrimp. In these countries as well as in the United Republic of Tanzania, the shrimp fisheries subsector is also the most managed. Shrimp stocks are now fully-exploited and would benefit from a strengthening of regional cooperation for their assessment and management. It is considered that there are few offshore stocks that are underexploited from a biological point of view. Possibly the main exceptions to this are Madagascar and Mozambique.

Tuna, an important fisheries resource in the region, has been only marginally fished by national fleets, except in Maldives where tuna species have been fished in a unique manner for centuries. In Maldives, mechanization during the 1970s led to a rapid increase in tuna landings: from 30 000 tonnes in the 1980s to over 90 000 tonnes in the 1997 and a record of 138 751 tonnes in 2003.¹⁹ In other countries of the region, the tuna fishery is mainly pursued by foreign fleets (e.g. China, EU and Japan) on the basis of fishing agreements with the local countries or through joint-venture enterprises.

These agreements are significant sources of foreign exchange for some countries. However, faced with over- or full-exploitation of near-shore and coastal resources, most countries in the region plan to develop their own semi-industrial tuna fleets. For example, in Seychelles only small numbers of tuna were caught and landed before 1980. By the mid-1980s, 50 foreign purse seiners were licensed. In recent years, annual licence fees and the other income from fish processing, ship chandlery, and other ancillary support industries have made fishing the most important sector, surpassing tourism (SFA, 2003). Since 2000, a small national fleet of semi-industrial longliners targeting tuna and swordfish has developed, supported by economic incentives from the Seychelles Government and soft loans from the European Community. The country also plans to increase joint ventures with foreign companies in order to better

¹⁶ From SOWMCFM Country Review for Madagascar.

¹⁷ Some minor areas of the coast of Madagascar and Mozambique excepted, for example, along an isolated stretch of coast between Inhambane (city) and Villanculos.

¹⁸ From SOWMCFM Country Review for Mauritius and Gallène, 2002.

¹⁹ From SOWMCFM Country Review for Maldives.

access the industrial fishery. Other countries where such joint ventures are important include Mauritius and Mozambique.

The development of national fleets for tuna fishing is a potential increasing trend for the region. However, as established by the Indian Ocean Tuna Commission (IOTC) recently, with the exception of skipjack tuna, most of the important stocks (yellowfin, bigeye and swordfish) are fished above their maximum sustainable yield (IOTC, 2003 and 2004). Thus any developments in the subsector have to be gradually and correctly managed to prevent further overexploitation and economic marginalization of existing fishing operations while affording coastal countries access to the resources.

The development of national fishing fleets for transboundary and highly migratory species requires consideration at the national level of the objective hierarchy and the appropriate exploitation methods (development of a national fleet versus fishing agreements, maximization of employment objectives versus foreign exchange) and a consolidation of regional cooperation, which remains underdeveloped in the region.

Another critical issue for the region, noted above, is the lack of primary data (e.g. landings, fishing effort and biological data) on which to base reliable stock assessments. Deficiencies in the registration and monitoring of landings, fishers, vessels and landing points vary by country but are widespread, generally because of a lack of human and financial capacity, together with inadequate structures and procedures. The isolated nature of some regions makes the problem worse.

At the regional level, IOTC collects and analyses data on tuna and tuna-like species for stock assessment. Currently, there is no regional body or agreement to assess the other resources although the Southwest Indian Ocean Fishery Commission (SWIOFC) should help to fill this gap once it is operational. SADC-initiated projects, co-financed by the Norwegian Agency for Development Co-operation (NORAD) and the German Technical Cooperation Agency (GTZ), to assess marine resources of the east side of the SADC area should also benefit the subregion. Since 1999, SADC and the FAO have also been collaborating to initiate a research project on the large marine ecosystem (LME) of the southwestern Indian Ocean. The Global Environment Facility (GEF) is supporting an LME project, currently in the preparation stage, for the Agulhas Current and the neighbouring Somali Coastal Current LME. This project aims to assist in the conservation of coral reefs and to enhance their socio-economic value. The World Conservation Union (IUCN) has established a database of fisheries methods, areas and gear as a tool for an ecosystem approach to coastal fisheries management.

REGIONAL MANAGEMENT ACTIVITY

Several factors have hindered the development of regional cooperation in the southwestern Indian Ocean. The following are examples.

- Artisanal fisheries in the lagoons and very near-shore areas dominate national production. The development of motorized artisanal and semi-industrial fleets covering a larger geographical area is a relatively recent trend.
- Even in cases where the same or similar species are fished, the concept of stock and transboundary fisheries is poorly documented in the subregion.
- EEZ boundaries and shared waters between the Comoros, Madagascar, Mayotte and Seychelles remain an unresolved issue, which poses a problem for both the implementation of national policy and the definition of regional plans.
- Tuna species that are the main transboundary and migratory species of the subregion were not traditionally fished by the regional countries themselves. With the exception of Maldives, such fisheries are of very recent origin.
- The process of establishing the Southwest Indian Ocean Fisheries Commission was set back by high seas issues relating particularly to orange roughy fisheries mainly in the southern Indian Ocean.

The Indo-Pacific Tuna Development and Management Programme (IPTP) was one of the first attempts to organize cooperation between tuna fishing countries. This programme has been replaced by the IOTC. Apart from the development of fisheries regional bodies that are described below, other regional initiatives should be noted, such as the 2002 fishery protocol signed by SADC, even though this economic organization does not cover the entire subregion. Within SADC, activities related to the establishment of effective cooperation on monitoring, control and surveillance (MCS) among the SADC coastal member states (Angola, Mozambique, Namibia, South Africa and the United Republic of Tanzania) have been undertaken as well as activities related to information collection, training, review and analysis of legal issues, economic planning analysis and co-management review.

Apart from these regional initiatives, countries in the region manage marine fisheries within their territorial waters at the national level. The extensive artisanal fisheries are managed to a lesser extent than the semi-industrial and industrial fisheries, which often have limited entry, quotas and/or other management conditions applied to them. Limited entry provisions and the control of fishing capacity within the artisanal and traditional sectors are rare, although in the islands of Mauritius, Rodrigues and Agalaga, a buy-back programme for the voluntary relinquishing of nets and net permits in return for financial compensation to permit holders and fishers has been in operation since 1996.²⁰ This programme was combined with a further reduction in the number of nets allowed in the Fisheries Act of 1998. The buy-back programme will continue until such time as the number of nets matches that fixed in the new Act. In addition, the artisanal sea cucumber fishery in the Seychelles has been licensed since 2001, and, as a precautionary measure, a quota of 25 fishing licenses is applied to this fishery. Likewise, the Seychellois lobster fishery is also managed through time restrictions (open/close seasons) and quota on fishing licenses (SFA, 2003).

As shown in Table 5, classic management tools, such as gear restrictions, licences and limited entry, are used for industrial and semi-industrial fisheries. Typically, licence numbers have been frozen in fully- and overexploited fisheries, such as the shallow-water shrimp fisheries in Mozambique. Quotas are rarely used in the region even though at least one fishery in each country is under some kind of catch restriction.

Spatial restrictions, such as bans or closed areas, are also widely used in the subregion for industrial and artisanal fisheries to avoid gear conflict or to protect specific areas. Marine parks, reserves or marine protected areas have been created in all but two countries of the subregion and there are indications that the degradation of reef fisheries and ecosystems has been slowed along those stretches of coast where marine protected areas have been established, for example in Kenya, including Malindi, Watumu and Mombasa (McClanahan and Arthur, 2000).

Despite the efforts made by the countries over the past ten years, compliance with and enforcement of management regulations remains a major issue. Enforcement is undertaken either by agencies other than the fisheries management agency, generally the national coast guard, police or the navy, all of which have duties and priorities other than fisheries, or it is performed by the fishery management agency, which often lacks the physical and human capacity to fulfil the task. The level of compliance with national regulations is thus often low, particularly in artisanal fisheries. This is the case, for instance, in Mozambique where 75 percent of fisheries are theoretically managed, but where a very small part is effectively managed despite a noticeable improvement resulting from the political stabilization and the establishment of a distinct Fisheries Ministry.²¹ In industrial fisheries, almost all countries have introduced

²⁰ From the SOWMCFM Country Review for Mauritius.

²¹ From the SOWMCFM Country Review for Mozambique.

TABLE 5
Management activity for the major artisanal and industrial fisheries of the region

Country	Limited entry or other capacity controls		Catch restrictions (quotas, etc.)		Time restrictions (seasons, etc.)		Spatial restrictions (closed areas)		Gear restrictions (mesh size or gear type)	
	Artisanal	Industrial	Artisanal	Industrial	Artisanal	Industrial	Artisanal	Industrial	Artisanal	Industrial
Comoros ¹	No	n.a.	No	n.a.	Some	n.a.	Some	n.a.	Some	n.a.
Kenya	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
Madagascar	No	Some	No	No	Some	Some	yes	Yes	Yes	Yes
Maldives	No	Some	No	Some	No	No	Some	No	Some	Yes
Mauritius ²	Some	Some	No	No	Some	No	Some	No	Yes	Some
Mozambique ²	No	Some	No	Yes	No	Some	No	No	No	Yes
Seychelles ²	Some	Yes	No	No	Some	No	Yes	Yes	Yes	Yes
South Africa	Yes	Yes	Some	Yes	Yes	No	Yes	Yes	Yes	Yes
United Republic of Tanzania	No	Some	No	Some	No	Yes	Yes	Yes	Yes	Yes
At least one on the main fisheries of the country under such restrictions										
All main fisheries under such restrictions										
n.a. = Not applicable										
None of the main fisheries under such restriction										

Notes:

¹ Customary rules are applied in the Comoros that can vary from one island to the next or from one village to the next. The national legal framework is focused mainly on gear restrictions to prevent endangered species from being caught as bycatch. However, the Comoros has sought the technical assistance of FAO to renew the law on fisheries and aquaculture and has formulated an operational strategy for the management and development of its fisheries. The new legal framework for Comoros fisheries should be ratified in 2005.

² Mauritius, Mozambique and Seychelles have semi-industrial sectors. Limited entry and quotas exist in the Mauritius Banks fishery. Seychelles has vessel limits on swordfish longlining and quotas in its mothership management plan. Mozambique limits semi-industrial shrimp vessels.

vessel monitoring systems (VMS) technology²² to assist in monitoring activity. The Comoros are also interested in adapting this technology to the artisanal fleet for monitoring and safety purposes.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The costs (and budgets) of fisheries management have increased within the subregion for three main reasons: the development of fishery management, conflict resolution within the coastal zone and high seas monitoring. For example, the cost of Mauritius fisheries management rose from Rs 37.14 million to Rs 96.345 million between the financial years 1993/1994 and 2002/2003, representing a real annual increase of approximately 3 percent.²³ In the case of Mozambique, the increase was mainly the result of updating the fisheries law, including the management of new fisheries, trials with new management tools and the modification of institutional arrangements as shown in Table 6. Another example is the Maldives reef fishery where the resource base is limited and characterized by multiple users: as valuable non-extractive uses of the fishery resources have developed, so have conflicts between the tourism and fisheries sectors. Dealing with such conflict has required increased monitoring and the implementation of new regulations to manage the reef fisheries.

The Maldivian case also illustrates the third main source of increased cost. Maldivian tuna fishermen operate within 50 miles of the atolls and the Maldivian EEZ is therefore relatively underfished. Maldivian fishermen strongly believe that illegal fishing in the EEZ by foreign vessels affects tuna catchability and school formation in the near-shore areas. The fishers report illegal, or suspected illegal, activity to the Maldivian coast guard who have been responsive in dispatching their vessels to investigate such cases. As a result, the cost of monitoring has considerably increased as the number of vessel apprehended over the years has increased.²⁴

Despite this general increase in management costs, in no country of the region are the participants in the fisheries sector required to pay the full cost of management, research or enforcement for the sector and the concept of “user-pays” is unknown in the area. Governments receive revenues from marine fishing activities from two main sources: (i) fishing agreements and royalty payments for foreign industrial fishing and (ii) licence fees paid for vessels and fisher licences.

Royalty payments from tuna fisheries and fishing agreements constitute a non-negligible source of revenue for most countries in the subregion. Licence fee revenues from the national fleet are generally low and are unrelated to the real cost of fishery management. In Mauritius, licence fees from national and foreign fishing vessels together represent 87 percent of the fishery revenue, which represented approximately 26 percent of the running costs of management for the 2002/2003 year.²⁵ Licence fee revenues are neither fully nor directly channelled back into fisheries management with the exception of South Africa where all taxes and other funds recovered from the fishing industry are allocated to the Marine Living Resource Fund giving greater autonomy to administer these funds for research and compliance.²⁶ In Madagascar, about 20 percent of licence fee revenues are directly transferred to the Aquaculture and Fishing Resource Development Fund (FDHA).²⁷ In the Comoros, the entire budget

²² Mauritius is in the initial phase of introducing VMS technology.

²³ Data from the SOWMCFM Country Review for Mauritius. This change represents an annual increase of about eleven percent. However, inflation was around eight percent per annum over the period, so the real increase in expenditure was around three percent per annum, still an appreciable increase, but less than might be inferred from the unadjusted figures.

²⁴ During the period 1991–2000, 2 to 17 vessels per year were apprehended by the coast guard. Source: the SOWMCFM Country Review for Maldives.

²⁵ From the SOWMCFM Country Review for Mauritius.

²⁶ From the SOWMCFM Country Review for South Africa.

²⁷ From the SOWMCFM Country Review for Madagascar.

TABLE 6

Main changes affecting the cost of fisheries management in Mozambique since 1990

	1990	2004
Existence of a fisheries ministry	No	Yes
Number of provincial fisheries directorates	0	4
Number of IIP ¹ Delegations	1	7
Number of artisanal monitoring fishing centres	2	19
Number of comanagement trials	0	More than 20
Number of fisheries closed	0	1
Existence of a fisheries law	No	Yes
Existence of sport fishing regulations	No	Yes

¹ National Fisheries Research Institute (IIP)

Source: SOWMCFM Country Review for Mozambique.

TABLE 7

Ratification of UNCLOS, FAO Compliance Agreement and the UN Fish Stocks Agreement

Country	UNCLOS	Compliance Agreement	Fish Stocks Agreement
Comoros	1994		
Kenya	1989	1994	2004
Madagascar	2001	2001	
Maldives	2000	2000	1998
Mauritius	1994	2004	1997
Mozambique	1997	1997	
Seychelles	1991	1994	1998
South Africa	1997	1997	2003
United Republic of Tanzania	1985		

of the Fisheries Department is met from (a small part of) the EU fishing agreement.²⁸ In the United Republic of Tanzania, provisions have been made within the New Fisheries Act to establish a Fisheries Development Fund that would meet a number of development and resource management obligations.

The lack of any “user-pays” principle, together with the absence of an explicit relation between the costs of required management and revenues, means that fisheries management agencies are constrained to adjust their management and supporting activities to the level of annual government appropriations.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

All countries in the subregion have signed and ratified the UN Convention on the Law of the Sea (UNCLOS), and the FAO Compliance Agreement has also been ratified by a large majority of the countries (Table 7). Fewer countries have signed the UN Fish Stocks Agreement. The latest, Kenya, ratified it in 2004 as it became a member of the IOTC.

As noted earlier, the fishery protocol in the framework of the SADC, which involved Mauritius, Mozambique, Seychelles, South Africa and the United Republic of Tanzania, includes an obligation to make provision in legislation for UNCLOS, the Compliance Agreement and the Fish Stocks Agreement. This initiative may encourage some countries to ratify the agreements and other countries to make provisions in their legislation.

Individual country performance on implementing International Programmes of Action (IPOAs)²⁹ is uneven. However, all countries have initiated actions on at least one IPOA and are in the process of developing National Plans of Action (NPOAs).

²⁸ Talla, De Young and Gallène, 2004.²⁹ International Plans of Action (1) to reduce incidental catch of seabirds in longline fisheries, (2) to conserve and manage sharks, (3) to manage fishing capacity and (4) to prevent, deter and eliminate illegal, unreported and unregulated fishing.

For example, in South Africa, high seas fishing permits have been introduced for flag-state vessels and this has helped control domestic effort. However, high seas activity by flag-of-convenience vessels remains difficult to control. Monitoring of the landings of illegal, unreported and unregulated (IUU) vessels has dramatically improved in South Africa, as well as in other ports in countries signatories to the South East Atlantic Fisheries Organization (SEAFO) and the SADC Fisheries Protocol.

Seychelles produced an NPOA against IUU in 2004 that sets out state responsibilities such as control over nationals, sanctions on unauthorized fishing by national vessels outside of its EEZ, a review of practices relating to IUU fishing and Port State and Coastal State measures that it has established. Several measures against IUU fishing are in place in Mauritius and a formal NPOA against IUU is in preparation.

Mauritius and Seychelles are also in the process of developing an NPOA for sharks and a 10-year ban on coastal shark fishing is in place in seven atolls in Maldives. An NPOA on shark management has also been initiated in South Africa and is expected to be submitted in 2005.

As a member of both the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), South Africa complies with catch documentation schemes and has taken initiatives in all longline fisheries to introduce methods to mitigate seabird mortality. An NPOA on shark management has also been initiated and is expected to be submitted to FAO in 2005. Madagascar expects to present an NPOA against seabird mortality in 2005.

Kenya and the United Republic of Tanzania are party to a regional plan of action (RPOA) for Lake Victoria, with elements that are applicable to marine fisheries. The United Republic of Tanzania has requested the assistance of FAO (Subregional Office in Harare) in the preparation of an NPOA in 2005 that would cover both its inland and marine fisheries.

It is noticeable that while control and enforcement is a major issue everywhere and most countries have small high seas fleets, the IPOA to prevent, deter and eliminate IUU is the plan for which most actions were initiated, leading to the subsequent increase in national management cost as shown above in the Maldives case. This is largely related to global and international initiatives and the financial support provided. It would benefit inshore and coastal fisheries resources if such support was also directed to the prevailing management and IUU issues found in many of the artisanal fisheries of the region.

REGIONAL FISHERY BODIES (RFBs)

As noted above, a number of factors have hindered the development of regional cooperation in the southwestern Indian Ocean. However, the degradation of coastal environment, the full exploitation or depletion of coastal fishing grounds widely experienced within the region and the full- or overexploitation of shrimp stocks and of the main tuna and tuna-like species have revealed the need for more regional cooperation both to conserve transboundary and highly migratory stocks and to ensure the sustainability of national fishing plans.

To date, there are two regional fishery bodies covering the southwestern Indian Ocean, both related to tuna and tuna-like fisheries: the Indian Ocean Tuna Commission (IOTC) and the Western Indian Ocean Tuna Organization (WIOTO).

The IOTC is a management body created in 1994 (entry into force 1996) with the following mandate:

- to review, collect and disseminate statistical information;
- to encourage, recommend and coordinate research and development activities;
- to adopt conservation and management measures to ensure the conservation of the stocks covered; and

- to keep under review the economic and social aspects of the fisheries.

The WIOTO, created in 1992 (entry into force 1994), is an advisory body that aims for the following:

- to harmonize policies with respect to fisheries;
- to manage relations with distant water fishing nations;
- to ensure fisheries surveillance and enforcement;
- to develop fisheries; and
- to ensure reciprocal access to EEZs of other members.

The IOTC is a very active RFB whereas the last WIOTO meeting was held in Seychelles in 1995. Currently, a minority of the countries in the southwestern Indian Ocean subregion participate in these RFBs: Madagascar, Mauritius, Seychelles and recently Kenya are members of the IOTC; while the Comoros, Mauritius and Seychelles are members of the WIOTO. Some non-member countries also cooperate with the IOTC. Maldives, for instance, participates regularly in technical meetings. South Africa has an observer status in these RFBs: in keeping with the greater importance of its Atlantic-based fisheries, it is a full member of both the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the South East Atlantic Fisheries Organization (SEAFO).

Non-member countries have no legal mechanism to implement measures adopted by regional fisheries bodies, such as IOTC. However, the Commission has not so far adopted any measures pertaining to spatial, temporal, gear, size, catch or access restrictions.

Despite this lack of formal involvement in tuna RFBs, a movement towards the reinforcement of regional cooperation is noticeable with negotiations initiated in 1999 for the establishment of a new RFB, the Southwest Indian Ocean Fishery Commission (SWIOFC).

It is intended that the SWIOFC be a management body covering fishery resources under national jurisdiction and high sea species not covered by other RFBs. The preliminary discussions for the establishment of the SWIOFC involved a number of the subregional countries such as the Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles and the United Republic of Tanzania. The regulation of fishing activity in non-tuna fisheries on the high seas adjacent to southwestern Indian Ocean countries is in the final processes of negotiation and the Fifth Intergovernmental Consultation on the establishment of a Southern Indian Ocean Fisheries Agreement will take place in Mombasa, Kenya, in April 2005, back-to-back with the First Session of the SWIOFC.

SUMMARY AND CONCLUSIONS

Fisheries exploitation and management in the southwestern Indian Ocean region are typical of the situation in many of the world's fisheries.

- Fishery management reforms have improved the political framework for fishery management but some of the objectives are potentially contradictory and lack prioritization.
- Fishery information systems are generally inadequate so that management must operate in a data-poor environment. Data are often missing on even the most basic elements such as the number of fishers and where they land, what they land and in what quantities, and the amount of fishing effort they use (even expressed in simple terms such as the number of active vessels).
- Stock assessments are mostly perfunctory and focused largely on high-value export fisheries. Given this data-poor situation, it is difficult to make strong statements concerning stock status. However, the qualitative evidence suggests that fish resources are increasingly fully- or overexploited (biologically), especially in coastal waters.

- Fisheries policy remains, by and large, linked to the development concept that has been shown to lead to failure in many other countries. The key feature is one of progressive overexploitation, with the “solution” to overfishing in coastal waters being seen as the development of technically more powerful fishing fleets capable of fishing further offshore. Such development must also emphasize management of the coastal and inshore waters for any chance of long-term success and sustainability.
- Management systems seem generally to have little impact. Implementation of existing management systems and fisheries regulations seems generally poor. The main problem appears to be the difficulty in controlling fishing capacity, particularly in small-scale fisheries. This difficulty may be one factor explaining the policy approach referred to in the previous point.
- The objectives assigned to the fishery sector are generally macroeconomic in nature (employment, incomes, foreign exchange and so on), but little, if any, attention is given to the way in which the sector can best contribute to these goals, nor to the potential conflict between them. For instance, at present, many of the countries in the region seem to rely on foreign fleets fishing offshore to generate foreign exchange through licence fees, but at the same time wish to develop their own fleets to fish the same resources in the same areas.
- The regional and shared nature of many of the fish stocks is in contrast to the poorly developed institutions for regional management. Until recent years, there has been limited interest in regionally-based management, although this may be changing with the development of the SWIOFC.
- Some EEZ boundaries and shared waters remain unresolved - a problem for both the implementation of national policy and the definition of regional plans.

Given the data situation, it is difficult to be sure of the precise impact of these features but the qualitative evidence suggests that fish resources are increasingly fully- or overexploited (biologically), especially in coastal waters. The overwhelming need therefore is for management frameworks to be established within which controlled exploitation of fish resources can take place.

Progress has been made in the policy and legal frameworks for management. The issue now is to develop fishery management plans for well-defined (and manageable) fishery management units. A key feature of these plans must be recognition of the fundamentally economic basis of most fishing activities in the subregion and to use this as a building block for management. Other useful features would include:

- the introduction of adaptive management strategies, based on strengthened management structures with well-defined, prioritized objectives and secure funding;
- the consolidation of a scientific advisory function with responsibility for standardizing methodologies for stock assessment and bio-economic analysis; and
- better control over growth in fishing fleet capacity, with restrictions on subsidies that, elsewhere, have in the past resulted in increased fishing effort. Effective enforcement of fishery regulations, with strong support at the political level, is required.

As noted above, fisheries management in the subregion is increasingly linked with tourism or environmental management directly through the line ministry or through marine parks. In fact, the development of international tourism (in particular, eco-tourism), which is of great economic importance to the region, also represents a challenge to the marine fishery sector. Fisheries management will increasingly need to take into account this fundamental trend. The development of tourism may represent an opportunity for the marine fisheries sector (e.g. increased environmental protection and economic opportunities), but it may also be a threat (conflict, competition for

space, greater demand for high quality reef fish, pollution, and so on). The development of sustainable tourism following good codes of practice and respecting traditional activities is likely to be crucial for the survival of coastal fisheries. The development of a legal framework that includes both activities will also be necessary.³⁰

The development of regional fishery bodies, especially the SWIOFC, is of great importance. Such bodies can play a number of important roles in the case of shared stocks but also in the case of national fisheries management. They can provide, for instance, a framework for sharing of information and resources (e.g. for research, given the limited nature of such resources), and may also be able to help individual countries develop management plans by providing information on current best practices. The SWIOFC may also have an important role to play in representing the interests of the fisheries sector in regional debates concerning, for instance, the development of sustainable tourism, integrated coastal management and marine protected areas.

States should ensure their active participation in regional initiatives such as the SWIOFC and several regional initiatives such as the SWIOFP, a regional MCS network, and the Somali-Agulhas LME. Greater harmonization of the definition and application of regulations and instruments, where appropriate, would be constructive development.

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³⁰ Among recent developments, the World Tourism Organization proposed the establishment of a worldwide Tourism Sustainability Observatory for Small Island Developing States (SIDS) at the United Nations conference on Small Islands that was held in Port Louis, Mauritius in January 2005. In February 2005, another meeting, held in Oman under the auspices of the World Tourism Organization and UNESCO in the western Indian Ocean, led to the Muscat declaration on built environments for sustainable tourism.

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ANNEX 1**Country reviews**

Country review: Australia (Indian Ocean coast)

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INTRODUCTION

The Indian Ocean coast of Australia, for the purposes of this review, includes the fishing areas off the coasts of Western Australia and the Northern Territory. Other areas of Australia (particularly those bordering the Pacific Ocean) are not reported on.

The Indian Ocean coast of Australia extends from tropical waters in the Northern Territory and the northern parts of Western Australia to sub-temperate areas in the south of Western Australia. Like the Pacific coast of Australia, this Indian Ocean coast represents a large fishing area although production is limited by the lack of extensive, nutrient-rich upwelling and the generally narrow continental shelf. However, while production volume is limited, the value of that production is significant because of the predominance of high value species such as lobster, shrimp, abalone etc. Although the pearling industry is a major industry in the northern parts of Western Australia, it is not considered as part of this review since it is primarily an aquaculture activity (albeit the pearl shell for culture purposes is taken from wild stock),

In general, the management of fisheries in Australia is very highly developed and is characterized by a collaborative approach between Government and Industry. All major fisheries are limited entry in nature although entry entitlements to these fisheries are generally freely tradable. In recent years, two significant trends have emerged. Firstly, the move to a 'user pays' system where participants in each fishery are increasingly responsible for funding management, research and compliance costs that support the fishery. Secondly, the broadening of management objectives away from a 'single-species' approach to include more general ecosystem management issues. This second trend has been driven by Australia's more general commitment to the principals of Ecological Sustainable Development (ESD).

POLICY FRAMEWORK

Being a confederation of States, both legislative and policy frameworks for fisheries management reside at both national and at state levels with various co-ordination mechanisms being in place to ensure that general fisheries management policy issues are consistent between national and State authorities. The fisheries of the Indian Ocean area of Australia are primarily managed at the State level, either because the fishery lies within State territorial waters¹ or because arrangements have been put in place under Offshore Constitutional Settlement arrangements for the national Government to delegate its powers to the State². At the State level, specific fisheries management objectives are set out in State legislation, particularly the *Fisheries Resources Management Act (1994)* in Western Australia. At the national level, these objectives are contained in the *Fisheries*

¹ The State territorial waters are generally within 3 nm of the coast but also include 'internal waters' which may consist of specific embayments, Gulfs etc.

² This is the situation for the important western rock lobster fishery which extends offshore beyond the State territorial waters but which is managed by the State of Western Australia.

Administration Act (1991) and the *Fisheries Management Act (1991)*. In cases where fisheries cross borders between state and national jurisdiction (for example, the western rock lobster fishery), the provisions of the Offshore Constitutional Settlement (OCS) arrangements usually apply. These arrangements provide for consistent management of cross-jurisdictional fisheries.

For fisheries that cross State borders, the management arrangements tend to be handled independently by the various states within their area of jurisdiction with mostly informal co-ordination in management policy. However, in the Indian Ocean area of Australia, there are few fisheries that cross the border between Western Australia and the Northern Territory and hence this co-ordination issue seldom is of practical significance.

At the national level, fisheries legislation is reviewed on an annual basis and necessary amendments to the legislation made. At the State level, legislation is reviewed on a regular (according to need) basis and major legislative reviews undertaken each 5-10 years. At these annual or major reviews, international mandates etc are considered for incorporation into national and State legislation. Following Australia's ratification of the UN Fish Stock Agreement in 1999, implementing national legislation came into force in 2001. Australia is currently in the process of accepting the FAO Compliance Agreement, the binding element of the FAO Code of Conduct for Responsible Fisheries and expects to deposit the Instrument of Acceptance in 2004 upon the passage of relevant national legislation. In general, all fisheries management policies in place in Australia at the national and State level incorporate the essential elements of the Code of Conduct for Responsible Fisheries.

The four pillars of fishery policy in the Indian Ocean area of Australia are (1) the move towards a 'user pays' system whereby the costs of fisheries management, compliance and research are fully funded by the stakeholders in the fishery³; (2) a general management approach of establishing limited entry fisheries⁴; (3) a collaborative approach to management where Government, industry and other stakeholders are formally and intimately involved in policy development and (4) an increasingly ecosystem-based approach to fisheries management where impacts of fishing activities on the general marine environment are incorporated into management decisions. As part of the trend towards incorporating a more ecosystem-based approach into its fisheries (and other natural resources) management arrangements, the Australian Government has adopted a framework for ensuring that fisheries are conducted within the provisions of Ecological Sustainable Development criteria. This framework uses environmental controls (including trade and export controls) of the *Environment Protection and Biodiversity Conservation Act (1999)* to ensure that fisheries are managed for long-term ecological sustainability.

The Western Australian *Fisheries Resources Management Act (1994)* specifically incorporates the principles of Ecological Sustainable Development (ESD) in its objectives and annual reporting of the State of the Fisheries in Western Australia therefore includes 'triple bottom line' reporting of economic, social and environmental objectives.

³ This move to a 'user pays' system is being increasingly applied to all commercial fisheries with the costs of management, monitoring compliance and surveillance (MCS) and research services being passed onto commercial fishers through annual license fees. Stakeholders are involved, through management advisory committees, in considering the levels of annual services, which are mostly supplied by Government.

⁴ The management arrangements for these limited entry fisheries are formalized in Management Plans for each fishery. As a result of the limited entry policy, commercial fisheries are generally very profitable and the value of access rights (i.e. licenses) to the major commercial fisheries is considerable. In addition, there has been a long term trend in some of the limited-entry managed fisheries for a concentration of ownership. This has resulted in a steady decrease in the number of operators in fisheries such as the western rock lobster fishery as individual operators consolidate their fishing gear onto a smaller number of more efficient vessels.

LEGAL FRAMEWORK

The major part of the Indian Ocean region of Australia borders the Western Australian coast with responsibility for fisheries managed within State jurisdiction of the area being with the Western Australian Department of Fisheries⁵. In the Northern Territory, responsibility for management lies with the Northern Territory Department of Business, Industry and Resource Development. At the national level, the organization responsible for fisheries management and compliance is the Australian Fisheries Management Authority (AFMA). Fisheries that lie in both State and national jurisdiction are managed under Offshore Constitutional Settlement (OCS) arrangements, which are essentially agreements between the States and the national government on management arrangements. The major fishery of western rock lobster is managed under OCS arrangements whereby the federal government effectively delegates its powers for management outside the 3 nm limit to the Western Australian State authorities.

Although the jurisdiction for fisheries management is shared between national and State authorities, there are legislative requirements in place that require coordination in management. In addition, the management approach, being participatory, also involves a wide range of stakeholder groups, including other Government ministries, fishermen, indigenous groups, recreational fisher's organizations, community and environmental lobby groups etc. As a result, a range of other legislation, codes of conduct and opinions impact on fisheries management outcomes. At the legislative level, these include issues relating to quarantine, crimes at sea, transport, telecommunications, marine safety, endangered species and ecological protection.

STATUS OF THE FISHERIES

In 2000-01, the total fish catch from the Indian Ocean areas of Australia was 36 290 tonnes of a total Australian (Pacific plus Indian Oceans) catch of 229 840 tonnes or 15.8 percent of the total Australian catch by weight (ABARE, 2002), a figure that has remained static since 1995/96. Although this total Australian production was valued in excess of \$AU1.3 billion, it represents less than 0.3 percent of Australia's GDP. In the Indian Ocean area, the high value species of lobster and shrimp dominate the sector, contributing around 49.5 percent of value but only around 34.6 percent of volume. The western rock lobster fishery, which is confined to Western Australia's south west coastline, is Australia's largest single fishery and alone contributes around \$AU300 million of the total value of Australia's Indian Ocean fisheries of \$AU700 million.

Fisheries in the area are generally fully utilized for all the known finfish, crustaceans and mollusk resources. Serious stock depletions have occurred but are not common although the Shark Bay snapper fishery in Western Australia suffered severe depletion as a result of both commercial and recreational over-exploitation. This fishery is now tightly controlled and a stock-rebuilding process is in place.

The status of each fishery is assessed (against performance criteria contained within each fishery's management plan) and reported on annually by the management agency to State and National Governments through formal State of the Fisheries reports. In addition, the western rock lobster fishery has been independently assessed by the Marine Stewardship Council in 2000 and was the first fishery in the world to be certified as 'sustainable' according to the MSC criteria.

⁵ The Western Australian Fisheries Department administers a number of Acts relating to management of marine fisheries, the most important being the *Fisheries Resources Management Act (1994)*. Among other provisions, this Act formally establishes consultative mechanisms by the setting up of Fisheries Management Committees for each major commercial fishery (e.g. The Rock Lobster Industry Advisory Committee for the important western rock lobster fishery) with broad stakeholder representation. These MACs provide advice directly to the Minister.

The three largest fisheries in Australia's Indian Ocean area by volume are the western rock lobster fishery, the Shark Bay scallop fishery and the Shark Bay and Exmouth Gulf shrimp fishery. All of these fisheries are located in Western Australia with the largest fishery in the Northern Territory being the crab fishery, which takes around 1 100 tonnes per annum.

Finfish landings in the area are very small, considering the extremely large EEZ of Australia's Indian Ocean area, a reflection of the low productivity of this western coast of Australia. The landings of all species of finfish in the Indian Ocean area of Australia slightly exceed the landings of western rock lobster. However, these finfish landings are taken in a large number of separate locations by a variety of gear over more than 3 500 km of coastline and do not constitute a single 'fishery'.

Because of strict management controls and limitation of access, most fisheries remain very profitable. Almost all fisheries now operate under a limited access arrangement although access licenses are usually freely tradable. This arrangement has led to significant increases in access license values, resulting in a concentration of ownership of access rights and economic barriers to new entrants.

Continued and improved fisheries management within the requirements of ecological sustainable development (ESD) is the key objective for the Australian fishing industry. The challenge may well be to achieve this objective in a way that minimizes the concentration of access rights to a small number of fishers.

A summary of the largest fisheries in the Indian Ocean area of Australia in 2002 is presented in the Annex.

MANAGEMENT ACTIVITY

Australia has a well-developed system of fisheries management and all major (and most minor) fisheries are under formal management arrangements. In the Indian Ocean area, most major fisheries are under State management control. The development of fisheries policy is therefore undertaken by the Western Australian Department of Fisheries (for fisheries that are located in Western Australia) or by the department of Business, Industry and Natural resources for fisheries in the Northern territory. The process of policy development is a participatory one and involves all stakeholders (including other Government bodies, fishermen, interest groups etc) through formal consultation processes and by making draft management plans available for general public scrutiny and comment prior to implementation. All major fisheries have a published Management Plan, which is reviewed regularly, and policy development includes the formal process of Management Advisory Committees for major fisheries (which consist of stakeholder representatives) that provide advice directly to the Minister. The Minister also receives advice on management policy directly from the State Fisheries Departments in each jurisdiction.

The implementation of fisheries management measures is undertaken by State Fisheries Ministries and departments at the State level. For stocks that cross national and State jurisdictions, Offshore Constitutional Settlement arrangements are in place to provide consistent policy formulation and implementation of management measures across all jurisdictions.

Recreational fisheries are important in all Australian waters, including Indian Ocean waters. Recreational fishers are formally represented on Management Advisory Committees⁶ for those fisheries where there is an important recreational component, for example the western rock lobster fishery. Recreational fishers in major marine

⁶ In addition, a separate Recreational Fisheries Advisory Committee provides advice directly to the Minister on broad issues affecting recreational fisheries.

fisheries of rock lobster and abalone (in addition to freshwater fisheries) are required to be licensed although no license is required for marine recreational angling. For the abalone and rock lobster fisheries, additional restrictions on bag limits, gear limits and specific recreational seasons apply.

Indigenous fisheries are practiced throughout northern Australia although, until recently, little data was available on the extent of these fisheries. In 2000, the Bureau of Resource Sciences conducted a survey of indigenous fisheries. The study showed that an estimated 37 000 indigenous people⁷, or 91.7 percent of the indigenous population, aged 5 years or older and living in communities in northern Australia, fished at least once during the study period. In a twelve month period between June 2000 and November 2001, they study estimated that fishers harvested:

- 0.91 million finfish
- 0.98 million small baitfish
- 0.18 million crabs and lobsters
- 0.66 million prawns and yabbies
- 1.15 million molluscs
- 0.93 million miscellaneous species.

Catch weights were not recorded.

In the Indian Ocean area (i.e. Western Australia and Northern Territory), the three largest (by number, not weight, of catch) marine indigenous fisheries were mussels (582 000), other bivalves (232 850) and mullet (113 692). Being traditional fisheries, these fisheries are not specifically managed although local customs regulate harvesting to some extent. These fisheries are not covered by any specific management plans.

In Western Australia, one Aboriginal person may be appointed to a 14-member Recreational Fishing Advisory Committee, but there is no statutory requirement for an Aboriginal person to be appointed to other fisheries Management Advisory Committees. The Department does consult with Aboriginal communities however and involves Aboriginal communities in the Volunteer Fisheries Liaison Officer program.

With the approval of the Northern Territory Government, and after consultations with the Anindilyakwa Land Council and the Tiwi Land Council, the Northern Territory Fisheries Division has put in place the Anindilyakwa Consultative Committee and Tiwi Coastal Waters Consultative Committee. Both these committees are non-statutory. Aboriginal people are not yet represented on species-specific advisory committees in the Northern Territory, although the Minister for Primary Industry and Fisheries has approved Aboriginal membership on some Fishery Advisory Committees (FACs). Commercial licensees (including those of Aboriginal descent) are represented on species-based FACs (where they have been established) by a nominated person(s) elected by the licensees.

The number of stocks under management has increased over the past ten years as commercial interest is shown in a wider array of species and as management processes extend to species of lesser commercial or recreational interest. All managed stocks undergo formal and regular assessment to determine their status while management plans also incorporate a regular (usually each five years) and exhaustive review process.

In 2003 in the Indian Ocean area of Australia, of the 29 discrete fisheries, 2 were considered over-exploited, 22 were fully utilized, 3 underfished and 2 (all minor species) of uncertain status. There is a legislative requirement for managers to address over-exploited stocks and to implement recovery strategies and this is being done for the two stocks considered overexploited.

⁷ This number of 37 000 included fishers in Queensland as well as Western Australia and the Northern Territory. Of these, approximately 28 000 were located in the Indian Ocean part of Australia, i.e. in Western Australia and the Northern Territory.

Management tools in use are fishery-specific and, apart from a prohibition on the use of drift nets (legislated as part of the Fisheries Management Act 1991 and State legislation); there are no other blanket restrictions on the use of any management tool or fishing gear.

Over the past ten years however, there has been a trend towards the use of output controls in preference to the still commonly used input controls. In particular, Individual Transferable Quotas (ITQs) are being increasingly used as a management tool to enhance the sense of ownership of access rights among operators and also to encourage economic efficiency. However, management by output controls has, to date, been confined to minor fisheries and all of the major fisheries in the area are managed by input controls. In 2003, of the 29 fisheries under management, only 7 were managed by ITQ's, the most prominent being the abalone fishery of Western Australia.

After a detailed investigation, the western rock lobster industry and the Government managers recently rejected a move to introduce an ITQ management arrangement in the fishery.⁸

Fisheries management is also moving very clearly towards ESD principles where ecosystem effects of fishing are increasingly being addressed as part of fisheries management plans and planning. This process is being driven by national environmental legislation that requires management processes that will ensure ecological sustainability of fisheries. As a result, issues such as ecosystem impacts of fishing activities, bycatch assessment and minimization and marine conservation (often through Marine Protected Areas) are an increasingly important component of fisheries management processes and policies.

Industry initiatives to introduce ESD principles have also become common, partly as a result of perceived market advantage. The most visible of these initiatives was the certification of the western rock lobster fishery as sustainable by the Marine Stewardship Council, the first fishery in the world to achieve such certification.

With these broader policy issues in fisheries management, and with the need to address an increasing number of (often minor) fisheries, the major obstacle to more effective management in the future is limitation of resources to address, and to ensure compliance with, management measures. Compliance costs in particular are increasing rapidly, particularly since the Indian Ocean fisheries of Australia are often in remote locations. However, industry involvement in the management process and the almost universal adoption of a user-pays system (where the industry pays for compliance and other costs through license fees) has, to date, kept these compliance costs under control. At the national level, compliance costs are also increasing rapidly as Australia addresses remote fisheries (e.g. Patagonian toothfish) in its Southern Ocean territories. In addition, there is often insufficient scientific knowledge of the ecosystem implications of fisheries to support ecosystem-based management processes. Australia is addressing the resources issue through a variety of means, including moving to a 'user-pays' system of management where the owners of the access rights to fisheries are required to pay an increasing share of the costs of management, research and compliance for some fisheries.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

For all Australian fisheries, total costs of fisheries management, compliance and research has increased significantly over the past ten years and, in 2000, was \$AU148.1 million, or approximately \$US104 million (OECD, 2003). This total cost consisted of \$AU74 million (50 percent) for research services, \$AU26.3 million (18 percent) for management services and policy development and \$AU47.8 million (32 percent) for enforcement.

⁸ The issue of output controls has, however, recently re-emerged and is again under consideration.

Within Australia's Indian Ocean fisheries, nearly all of which are managed by the State authorities, the total costs of management has increased by about 3 percent per annum to 2003, with the total costs of management (including management activities, research and enforcement) in 2002/03 being approximately \$AU47 million.

The major commercial fisheries (including western Rock Lobster, Abalone, shrimp and scallop fisheries) however now operate in a fully cost-recovered management environment, which requires that licensees in these fisheries pay fees to cover the total cost of management. Cost recovery has been phased in over a number of years, with the final stage of cost recovery (100 percent cash costs plus capital accruals and employee entitlements) being reached in 2001/02.

As a result, the costs of management are increasingly met from the commercial fishing industry and Government contributions to management in the area are decreasing or are remaining steady. In Western Australia, Government contributions to the costs of managing fisheries have decreased from 60.5 percent of costs in 1996/97 to 35.5 percent in 2002/03.

Compliance costs incurred by the federal Government to deter illegal foreign fishing in Australia's northern waters have increased dramatically in the past ten years because of an increase in the number of vessels fishing illegally and an increase in detention and security costs. In 1998, the Australian Fisheries Management Authority (AFMA) began incurring costs to deter illegal fishing in Antarctic waters although in 2003, the Australian Customs Service took over the significant costs of providing patrol vessels for this area.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Australia ratified the UN Convention on the Law of the Sea (UNCLOS) in 1982 and UN Fish Stocks Agreement in 1999. In addition, Australia is in the process of ratifying the UN Compliance Agreement and this process is expected to be completed during 2004 after passage of relevant domestic legislation.

The objectives of UNCLOS and the UN Fish Stocks Agreement have been incorporated into national legislation as part of the Fisheries Management Act 1991 and are implemented, at both national and State levels, through formal Management Plans for each fishery. The obligations embodied in the FAO Compliance Agreement are in the process of being incorporated into the Fisheries Management Act (1991) and the Fisheries Administration Act (1991).

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has been, or is in the process of being, undertaken in appropriate fisheries. This is achieved by developing domestic legislation to address these provisions through the preparation of National Plans of Action. It is a legislated requirement (referred to as 'Strategic Assessment') that these National Plans of Action, when finalized, be incorporated into fisheries-specific Management Plans.

PARTICIPATION IN REGIONAL FISHERY BODIES

Participation in Regional fisheries Bodies is through the federal government authorities although often State Fisheries representatives may attend as observers on the Australian mission. Australia is an active member of a number of Regional Fisheries Bodies, primarily related to issues in the Indo-Pacific area. These include APFIC, IOTC, the APEC Fisheries Working Group, FFA, SPC CCAMLR and CCSBT. Australia has also signed and ratified WCPFC.

Measures that are adopted by these Regional Fisheries Bodies are usually incorporated into national legislation, particularly the Fisheries Management Act (1991) or are incorporated directly into specific Fisheries Management Plans. There is no legal requirement for *all* measures that are adopted by regional Fisheries Bodies to

be incorporated into national legislation and each issue is considered from a national perspective, after consultation with stakeholders.

SUMMARY AND CONCLUSIONS

The Indian Ocean area of Australia is characterized by a small volume, high value species assemblage and fisheries based on these high-value species of lobster, shrimp, crabs and abalone are both well-managed and profitable. Although most of the fisheries in the area are managed by State authorities, there is a well-developed system of fisheries management in place and authorities have generally succeeded in managing the domestic fisheries for long-term sustainability. In addition, because most fisheries are managed on a limited entry basis, over-capacity is not a significant issue in most fisheries. As a result, the major fisheries are often highly profitable. This arrangement has led to significant increases in the value of the tradable access rights to these fisheries, resulting in a concentration of ownership and economic barriers to new entrants. This has resulted, in most major fisheries, to a significant reduction in the number of operators (within a limited entry management environment) and therefore an increase in the concentration of ownership of access rights.

Continued and improved fisheries management within the requirements of ecological sustainable development (ESD) is the key objective for the Australian fishing industry. The challenge may well be to achieve this objective in a way that minimizes the concentration of access rights to a small number of fishers.

The approach taken by management authorities in Australia is a collaborative and participatory one, involving all stakeholders in policy development and implementation and this has generally led to broad acceptance of management measures. There has been a discernible shift in management approach over the past ten years towards managing outputs rather than inputs although the majority of fisheries (and certainly all the major fisheries) in the Indian Ocean area continue to be managed by input controls.

With the move to broaden fisheries policy objectives to a more ecosystem-based approach, the costs of fisheries management and supporting services of research and enforcement are increasing rapidly. With State Government funding for fisheries management remaining more or less static over the past ten years, the participants in the (mostly limited entry) fisheries are meeting an ever-increasing share of the total management and supporting costs through a 'user-pays' system. These costs, which in 2003, amounted to around 65 percent of total management costs in the Indian Ocean area, are collected through license fees. As a result of this trend, annual license fees in many fisheries are now very high although most fisheries are still very profitable despite these high fees.

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APPENDIX TABLES

Capture fisheries production (tonnes) and value (2002 \$US equivalent) for the period 1998/99-2000/01 for the Indian Ocean Coast Area of Australia

	Managed at state or national level?	1998/99	1999/2000	2000/01
Fish:				
Tuna	National and state	25	43	29
Other	State	19 904	20 022	19583
Total fish value		\$US38 million	\$US37 million	\$US40 million
Crustaceans:				
Shrimp (prawns)	State	4 649	4 663	2 976
Rock lobster	State	13 065	14 606	11 348
Crab	State	1 306	1 786	2 107
Other	State	233	275	365
Total crustacean value		\$US243 million	\$US345 million	\$US265 million
Molluscs:				
Abalone	State	341	333	316
Scallops	State	2 400	3 476	3 167
Squid	Mostly state	77	68	47
Other	National and state	1 143	1 217	1 424
Total mollusc value		\$US159 million	\$US172 million	\$US171 million
Total production		43 478 t	46 533 t	41 454 t

Current management of marine capture fisheries

Level of management	% fisheries managed	% with fisheries management plan	% with published regulations ¹	Trends in the number of managed fisheries over 10 yrs. (increasing/decreasing/unchanged)
National	> 67 %	> 67 %	> 67 %	Increasing
Regional	> 67 %	> 67 %	> 67 %	Increasing
Local	n/a	n/a	n/a	n/a

¹ In other cases of managed fisheries where no regulations have been published, licenses with conditions/rules are generally issued to participants under either national or State Fisheries Acts.

n/a = not applicable.

Summary information for three largest fisheries (by volume) for the fiscal year 2001/2002

Category of fishery	Fishery	Volume tons	Value ¹ USD	% of total volume caught ²	% of total value caught ²	Covered by a Management Plan? (Yes/No)	# of participants	# of vessels
Industrial	Western rock lobster	11 348	\$ 216m	27.4 %	42.8 %	Yes	1 597	570
	Shark Bay and Exmouth Gulf shrimp	2 976	\$33.5m	7.2 %	6.7 %	Yes	200	40
	Shark bay scallop	1 770	\$ 6.4m	4.3 %	0.9 %	Yes	164	41
Indigenous or artisanal	Mussels	582 000 ⁵	n.a	26.1%	n.a	No	Est. 28 000	Nil
	Bivalves	232 850 ⁵	n.a	10.4%	n.a	No	Included above	Nil
	Mullet	113 692 ⁵	n.a	5.1%	n.a	No	Included above	Nil
Recreational	Western rock lobster ³	545	Nil	n.k	n.k	Yes	39 263	n.a
	Abalone	104	Nil	n.a	n.a	n.a	21 458 ⁴	Nil

¹ Value in 2002 US Dollars.

² % values caught and % volume caught are based on totals for each category of fishery. For recreational fisheries, the proportion of the volume is not known because data is not available on all recreational landings. Value is not measured in recreational or indigenous fisheries.

³ The rock lobster fishery is managed as a single fishery with commercial and recreational components. Recreational catch includes diving (162t) and potting (383 t).

⁴ Includes umbrella licences covering all licensed recreational fisheries), with 8,680 specific abalone licences being issued.

⁵ Data in numbers. No data on catch weights are available.

n.a. = not available.

n.k. = not known.

Use of fishery management tools within the three largest fisheries in Australia, Indian Ocean

Category of fishery	Fishery	Restrictions				License/limited entry	Catch restrictions	Rights-based regulations	Taxes/royalties	Performance standards
		Spatial	Temporal	Gear	Size					
Industrial	Western rock lobster	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
	Shark Bay and Exmouth Gulf shrimp	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes
	Shark bay scallop	Yes	Yes	Yes	No	Yes	No	No	No	Yes
Artisanal /Indigenous	Mussels	No	No	No	No	No	No	No	No	No
	Bivalves	No	No	No	No	No	No	No	No	No
	Mullet	No	No	No	No	No	No	No	No	No
Recreational	Western rock lobster	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	Abalone	Yes.	Yes	Yes	Yes	Yes	Yes	No	No	No

Costs and funding sources of fisheries management within the three largest fisheries

Category of fishery	Fishery	Do management funding outlays cover			Are management funding sources from		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Western rock lobster	Yes	Yes	Yes	Yes	No	No
	Shark Bay and Exmouth Gulf shrimp	Yes	Yes	Yes	Yes	No	No
	Shark bay scallop	Yes	Yes	Yes	Yes	No	No
Artisanal /Indigenous	Mussels	Yes	Yes	Yes	No	No	No
	Bivalves	Yes	Yes	Yes	No	No	No
	Mullet	Yes	Yes	Yes	No	No	No
Recreational	Western rock lobster	Yes	Yes	Yes	Yes	No	No
	Abalone	Yes	Yes	Yes	Yes	No	No

Compliance and enforcement within the three largest fisheries

Category of fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	Western rock lobster	No	No	Yes	Yes	Yes	n.a.
	Shark Bay and Exmouth Gulf shrimp	Yes	No	Yes	Yes	Yes	n.a.
	Shark bay scallop	Yes	No	Yes	Yes	Yes	n.a.
Artisanal /Indigenous	Mussels	No	No	No	No	No	No
	Bivalves	No	No	No	No	No	No
	Mullet	No	No	No	No	No	No
Recreational	Western rock lobster	No	No	Yes	Yes	Yes	No
	Abalone	No	No	Yes	Yes	Yes	No

Capacity management within the three largest fisheries

Category of fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, specify objectives of capacity reduction programme
Industrial	Western rock lobster	No	Yes	Yes	Yes	1.Reduce effort 2.Increase spawning stock
	Shark Bay and Exmouth Gulf shrimp	No	Yes	Yes	No	
	Shark bay scallop	No	Yes	Yes	No	
Artisanal	Mussels	n.a.	No	n.a.	No	
	Bivalves	n.a.	No	n.a.	No	
	Mullet	n.a.	No	n.a.	No	
Recreational	Western rock lobster	No	Yes	Yes	No	
	Abalone	No	Yes	Yes	No	

n.a. = not available.

Country review: Bangladesh

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December, 2003

INTRODUCTION

Bangladesh¹ is rich in water resources, endowed with extensive flood plains drained by hundreds of rivers. Two large river systems, the Jamuna (Brahmaputra) and the Padma (Ganges), draining a substantial part of the north-eastern Indian sub-continent, laden with large quantities of suspended sediments, converge in Bangladesh's interior, and give rise to a very fertile delta system irrigating the coastal plains of the Bay of Bengal to the south.

Bangladesh's marine waters cover an area of roughly 166 000 km², of which the EEZ accounts for 141 000 km² (Flewwelling, 2000). The extent of the coastal shelf area (approximately 66 400 km² to the 200m mark) is rather important. A dynamic system of estuaries, islands and chars² is located along the entire coast facing south (*Mouths of the Ganges*). Winter lasts for an average period of two months (mid-December to mid-February), with modal temperature values ranging between 25°-33°C, and average annual rainfall ranges between 1 700 mm to 3 200 mm. Bangladesh is prone to natural disasters, the most prominent being cyclones, storm surges and floods.

Population and economy

Population in mid-year 2002 was estimated at 135.7 million, growing at an average yearly rate of 1.7 percent. Illiteracy is estimated at 59 percent of population age 15+, rural population stands at 74 percent (*i.e.* 100+ million people), and 48 percent of children under the age of 5 suffer from malnutrition.³ The total harvest of aquatic resources in Bangladesh (marine, inland & aquaculture) covers between 60-80 percent of the animal protein needs of the country, per capita consumption being estimated at 14kg/year (DANIDA/DFID, 2003). The contribution of agriculture to GDP dropped from just under 1/3rd in 1982 to just over 1/5th in 2002. Fisheries and aquaculture contribute 5.24 percent to GDP, and 4.76 percent to foreign exchange earnings through exports.⁴ In 2001-2002 marine capture fisheries represented 22 percent of the total fishery production⁵ in volume.

The dependence of the rural communities on fisheries resources, both inland and coastal, is very high. It must be noted that the inland fisheries, especially in floodplain

¹ Note: The information for this paper was gathered from many multi-media sources, the internet, and papers, some published and some being "grey literature", but a key source was a 53 page FAO Questionnaire sent to fisheries contacts in each country to assist them in formatting their responses. Data provided in these questionnaires comes from officials and Department's files, and are reported as "personal correspondence and discussions with Department officials". Additional information came from FAO, 1999a and 1999b, MOF, 2001, and UNDP, 2003.

² The word *char* or *charlands* is mostly used for newly accreted lands that can have the form of an island or an extension of the mainland coast. Coastal islands and chars are among the least known geographical entities of coastal Bangladesh for such reasons as remoteness, instability, and the resulting difficulties in mapping (ICZMP, 2003).

³ Source: World Bank online database: www.worldbank.org/data/countrydata/countrydata.html

⁴ Source: MOFL Data – total fisheries production, including marine capture fisheries.

⁵ Combined inland, aquaculture and marine sectors.

TABLE 1
Important marine fisheries sub-sectors, employment and returns (2000/2001)

Type of fishery	Output (mt)	Value added (Tk M)	Employment	Return on labour Tk/day
Commercial gillnet	430 157	23 968	114 308	698
Artisanal ESN/gillnet	30 259	1 404	17 500	267
Artisanal ESN/beach seine	103 394	1 348	32 561	138
Shrimp trawl	7 864	397	2 100	630
Industrial trawl	15 326	83	900	307
PL collectors (M)	2 500	1 377	185 000	25
Totals	589 500	28 577*	352 369	

Source: adapted from Table 8, "Marine Fisheries Sub-sectors". (DANIDA/DFID, 2003)

Notes: this table integrates certain types of fisheries vertically (e.g. mechanized and non-mechanized gillnet fishery), so that figures do not coincide with figures in tables 2, 3, and 4; *: equivalent to US\$484 356 000 at Sept. 2003 exchange rate US\$1,00 = 59Tk (Sept. 2003 exchange rate)

areas, form a major part of fisheries in Bangladesh. According to recent studies and figures (DANIDA/DFID, 2003) it appears that around 1.1 million people – landless and landowners – are directly involved in capture fisheries (*i.e.* catching fish). Of these, 37 percent (444 000) are involved in the coastal and marine fisheries. Nationwide (marine and inland combined), another 11 million are involved in fisheries on a part-time basis, and three million more gain sustenance from the value-adding and marketing sub-sectors.⁶ In Bangladesh, the poorest of the poor resort to fishing as a last livelihood option and represent the bulk of the fisherfolk. Table 1 provides an overview of the main marine fisheries capture sub-sectors, listing numbers of people participating in these fisheries, value added, and *per capita* daily returns on labour.

POLICY FRAMEWORK

In 1998, a new National Fishery Policy was drafted and approved by the Government of Bangladesh (GOB). As its overarching goal, the Policy states, "*poverty alleviation through creating self-employment and improvement of socio-economic conditions of the fishers*". This is in line with ongoing reforms in Bangladesh, hinging around a "*pro-poor*" growth strategy that the World Bank and the IMF are actively encouraging by pledging US\$1 billion in economic assistance for the fiscal year 2003-2004 (up 100 percent from the previous fiscal year), should reforms continue to progress at the present pace.

Inshore marine and estuarine fisheries are particularly affected by overfishing, environmental degradation, and multiple uses of water systems. The GOB has committed itself to protect the aquatic resources and habitats while seeking sustainable ways of maintaining resource benefits for the population. To this end, the government has drawn up a *Perspective Development Plan* for the period 1995-2010, providing direction to the fisheries sector and its development. Sustainable management of aquatic resources form an important part of the new National Fisheries Policy.

Specific objectives formulated in the last 5th five-year Plan (1997-2002) were:⁷

- increased fish production for improved nutritional standards;
- increased employment;
- improved environmental management;
- increased export revenues;
- improved socio-economic conditions for fishers and fish farmers;

⁶ Solid figures on numbers of fishermen in inland and marine fisheries sectors vary between, and sometimes within reports. This is due to the weakness of the national census, combined with the colorful complexity of the fisheries sectors – leading to many studies having raised figures that all differ to some degree.

⁷ The present government took the decision to move away from rigid 5-year planning to "*rolling*" 3-year planning. In September 2003, the first 3-year plan (2002-2005) had not yet been officially released.

- improved biological and institutional management mechanisms;
- strengthened research, extension and management co-ordination.

Notable in these objectives is the lack of responsible and sustainable management of fisheries. For example, the hilsa fishery⁸, the most important fishery in Bangladesh, does not have appropriate management planning or control measures to protect it from over-exploitation. Responsible fisheries management remains a major challenge to the GOB.

LEGAL FRAMEWORK

The Department of Fisheries (DOF) falls under the administrative control of the Ministry of Fisheries and Livestock (MOFL) and is headed by a Director General (DG), who is assisted by three Directors and two Principal Scientific Officers. The organization between MOFL and the districts is ordered into three levels, *i.e.* DOF in the capital city of Dhaka, headed by a DG, 64 District Fisheries Offices (of which 13 are coastal) headed each by a District Fisheries Officer (DFO), and Sub-District Offices (Upazilla Offices) headed by an Upazilla Fisheries Officer (UFO). Upazilla Offices number over 460 in total. The Marine Fisheries Ordinance provides for the delegation of a range of powers (enforcement, etc.) from the Director General to DFOs.

The base law is the *Marine Fisheries Ordinance* of 1983. It is applied through *rules* (equivalent of regulations), which were enacted in the same year as *Marine Fisheries Rules*, and amended in 1993.

A listing of a range of legal instruments related to, or impacting, marine capture fisheries management follows in reverse chronological order (FAOLex). More details on these regulatory tools are included in Annex B.

- Shrimp Culture Users Tax Ordinance, 1992
- Protection and Conservation of Fish Rules, 1985
- Ordinance to provide for the establishment of a Fisheries Research Institute, 1984
- Marine Fisheries Ordinance, 1983 (Ordinance No. XXXV)
- Marine Fisheries Rules, 1983
- Protection and Conservation (Amendment) Ordinance 1982 (Ordinance No. LV)
- Territorial Waters and Maritime Zones Rules, 1977
- Allocation of functions to the Ministry of Fisheries and Livestock (Schedule 1 of the Rules of Business, 1975)
- Bangladesh Fisheries Development Corporation Act, 1973
- Government Fisheries (Protection) Ordinance, 1959
- Protection and Conservation of Fish Act, 1950 (East Bengal Act 18 of 1950)

Though not all current legislative instruments are listed,⁹ it is apparent that the current legal framework is old. It is also an isolated body of law, focused on core fisheries issues and could benefit from jurisdictional linkages to coastal land use and tenure law, mineral exploration law, shipping law, water management law, etc.

The fisheries in Bangladesh are intimately linked to water resource management and land tenure considerations on the inland side, and integrated coastal zone management issues on the marine side. Multiple-use patterns of the coastal zone, notably between industrial fishers, artisanal fishers and aquaculture farmers indicates the need for a body of law that integrates the management with future requirements, *e.g.* impact of hydrocarbon exploration, etc.

⁸ *Hilsa* (ilish) any of the members of the genus *Tenualosa* of the family Clupeidae. The *Hilsa* constitutes the largest single-species fishery of Bangladesh.

⁹ Amendments to the 1983 Marine Fisheries Rules, enacted in 1993, are not listed. Their main thrust is the provision of MCS measures applicable to the artisanal sector. The same is true for the Fish and Fish Products Ordinance of 1983, which is not listed.

The need for integration of legislation is currently being addressed through the ICZM Programme¹⁰ which started in early 2002. This Programme provides a platform for decision makers and stakeholders to review current legislation related to the coastal zone through amendments, or to adopt a new integrated legal framework.

Current provisions in the ordinances and the rules are made for the protection and management of the resources, including, *inter alia*, the issuing of licenses, the keeping of logbooks, seasonal and spatial closures, effort control in industrial fisheries, gear specifications, as well as monitoring and law enforcement arrangements. Community-based fisheries management, and/or co-management arrangements are not part of the current management tools.

New legislation, banning in particular the practice of shrimp fry collection, aiming at phasing out the estuarine set bag net (ESBN) fishery, and foreseeing the declaration of an 800 km² marine reserve in the “*South Patches*”¹¹ is currently being prepared by the DOF.

STATUS OF THE FISHERIES

The fisheries of Bangladesh fall into two geographical categories, coastal/marine and inland fisheries. Fish production is supplemented on the national level by an ever more important aquaculture sector. Marine, inland and aquaculture sectors impact each other at various levels. Figure 1 retraces the growth in the three sectors over the last five years, showing the continued growth in all three, yet indicating a levelling off of inland fisheries output, and a decrease in relative contribution of the latter to the overall national production. The total marine catch in the 2001/2002 period amounted to 415 420 mt, up 52 percent from five years earlier.

Functionally, marine capture fisheries can be further subdivided into subsistence, artisanal, commercial and industrial fisheries, the lines between the first three sub-sectors being fluid. As is the case for inland fisheries, where catches are declining due to resource exhaustion, marine capture fisheries are faced with overfishing, rising conflicts and evaporating resource rent.

All marine fishing occurs within the 100 m isobath, deep-water pelagic and demersal resources remaining wholly unexplored and untapped by Bangladesh fishers, although there are reports of significant illegal foreign fishing offshore, but it is not addressed due to a lack of surveillance activity. The only industrial fishing developed in Bangladesh is operating out of Chittagong on the east coast. Figure 2 shows the volumes of the artisanal catch¹² and the industrial catch for three particular years over the last ten year period.

By volume, a fleet of 100 trawlers¹³ lands only six percent of the marine catch, artisanal fisheries accounting for 94 percent of the production. Data provided by DOF, especially those relating to artisanal catches, need to be consulted and used with caution due to the significant variance in data from enumerators deployed under the DFOs and UFOs¹⁴ to collect fishing effort data on the basis of gear units deployed per month per area monitored. These data are used to estimate total national catch on a yearly basis.

Table 2 provides an overview of the main industrial fisheries. There are only two distinct industrial fisheries in Bangladesh, and they target demersal shrimp and finfish resources.

¹⁰ ICZMP – Integrated Coastal Zone Management Plan, promoted by the UK, and the Netherlands, is implemented through the Water Resources Planning Organization (WARPO); Ministry of Water Resources (MoWR), Bangladesh

¹¹ Important spawning grounds for a range of finfish and shrimp species.

¹² Combining all subsistence & small-scale commercial fisheries.

¹³ Industrial trawler companies are partly state owned.

¹⁴ District Fisheries Officer (DFO) and Upazilla Fisheries Officer (UFO).

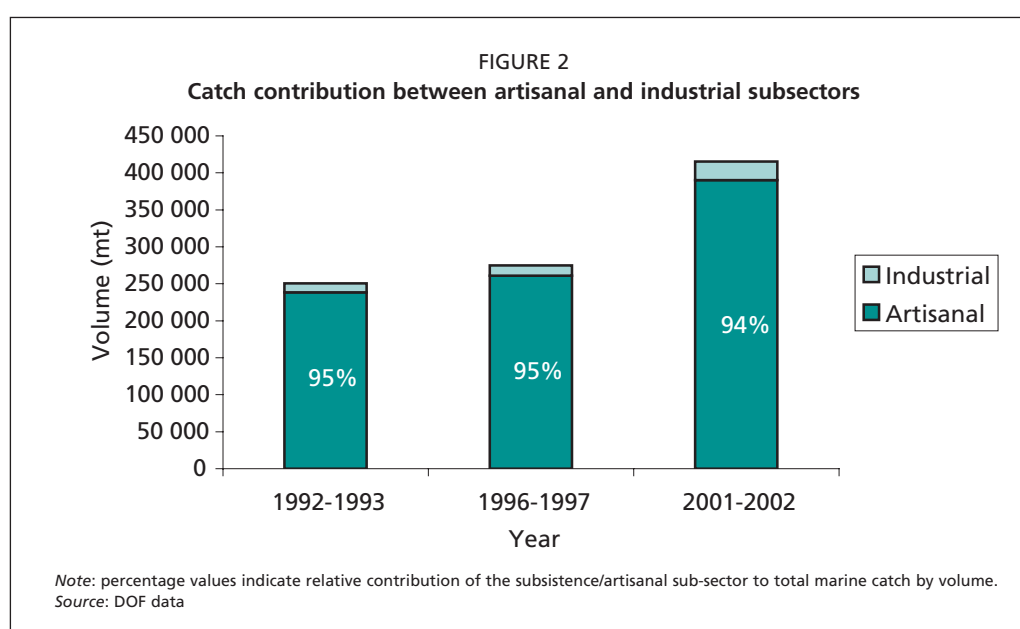
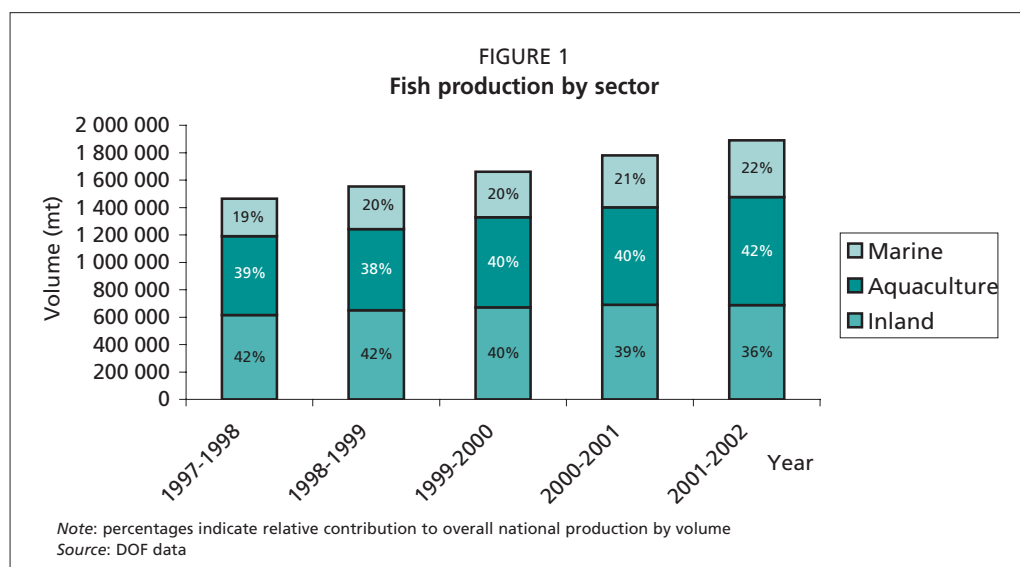


TABLE 2
Industrial fisheries 2001/2002 - overview

2 main gear types	Target species	Contribution to total marine catch (in mt)
Shrimp trawl	Shrimp	25 165 (6%)
Bottom trawl	Demersal finfish	
Totals		25 165 (6%)

Source: DOF data

The most important small-scale/artisanal fisheries are reported by DOF as mechanized gillnet fishery, shrimp fry collection, estuarine set bag net fishery, and trammel net fishery (see Table 3). In addition to these, non-mechanized gillnet fishing (35 125mt - 2001/02) and longline fishing (23 841mt - 2001/2002) are reported as two other major fisheries. Although these fisheries fall under “small-scale”, it needs to be borne in mind, that some are carried out with the simplest of means for purely commercial reasons, the shrimp fry collection fishery being the perfect example.¹⁵ The

¹⁵ The shrimp post larvae are being sold to aquaculture units.

TABLE 3
Small-scale fisheries 2001/2002 - overview

4 main fisheries	Target species	Contribution to total marine catch (in mt)
Mechanized gillnet	Clupeidae (<i>Denua losa ilisha</i>)	193 558 (10%)
Shrimp fry collection	Post-larval juvenile shrimp (PL)	2 500 (0.1%)
Estuarine set bag net fishery (ESBN)	Finfish and shrimp	121 251 (6%)
Trammel net fishery	Finfish and shrimp	9 605 (0.5%)
Totals		326 914 (16.6%)

Source: DOF data

TABLE 4
Fishers and their catches

FISHERY	VESSELS 2001-2002	FISHERS 2001- 2002	CATCH 2001/2002	CATCH 1996/997	CATCH 1991/1992
INDUSTRIAL					
Shrimp trawl	n.a.	2 100*	8 553	7 741	7 386
Bottom trawl	n.a.	900*	16 612	5 823	2 255
Sub-total	100	3 000	25 165	13 564	9 641
ARTISANAL					
Mechanized gillnet	18 992	100 000	193 558	127 725	122 935
Estuarine set bag net fishery (ESBN)	12 765	100 000	121 251	78 391	70 035
Trammel net fishery	1 103	500	9 605	3 679	3 715
Shrimp fry collection	none	400 000	2 500	n.a.	n.a.
Sub-total	32 860	650 000	324 414*	209 795	196 685
TOTAL	32 940	653 000	349 579	223 359	206 326

Source: DOF data

Note: n.a. = not available

*: DANIDA/DFID data

* : excluding shrimp fry collection

mechanized gillnet fishery is also a purely commercial fishery, carried out from small-scale motorized vessels.

Shrimp fry collection, though very modest in contribution to total marine catch by volume, is thought to affect recruitment in wild populations, and the practice has come under serious scrutiny from the authorities. The same holds for the estuarine set bag net fishery (ESBN), which is becoming increasingly unpopular with the authorities, and has contributed especially to the overexploitation of white shrimp stocks.

In general terms, the coastal marine living resources have come under too much pressure from too many entrants into the various small-scale fisheries. There are tens of thousands of vessels, and hundreds of thousands of nets, lines and other pieces of gear that are concentrating in the inshore and coastal areas, targeting anything and everything from post-larval shrimp to mature finfish.¹⁶ Conflicts within and between fisheries are rising, and scores of mechanized small-scale vessel operators are reported to be unable to cover operational costs – depending on the area and the fishery.

Catch per unit effort (CPUE) estimates and trends cannot be established for lack of appropriate data. One full frame survey was conducted in 1984, and no gear or vessel unit data had been collected until a “token survey” was carried out in 2000-2001, under which gear and vessel numbers were updated.¹⁷ It is thus difficult to establish a clearer picture of exploitation patterns. In general terms, it appears that the coastal fisheries resources, traditionally less exploited than inland resources (see figure 1), have come under pressure, as faltering inland fisheries yield less and less. Effort has partially been

¹⁶ In the ESBN fishery alone, there is an estimated number of 50 083 (2001/2002 figures) operative units installed along the shoreline and up into the estuaries.

¹⁷ It is the fact that catch statistics are based on gear units (which were not updated over a period of 17 years) that puts a question mark behind the reliability of catch estimates for the same period of time.

diverted to marine waters, and the old tragedy of the commons is now showing in coastal waters, where “open access” is the current management strategy.

MANAGEMENT ACTIVITY

From a practical point of view, management activity can be subdivided into two parts: management of the industrial fisheries and management of the artisanal fisheries.

Regarding industrial fisheries (shrimp & fish trawlers), the following is to be noted in terms of moving toward managed fisheries: a) the vessels are being licensed, and b) the DOF has put a cap on the number of vessels permitted to enter the fisheries, currently standing at 100 units.¹⁸ However, although some management tools are provided for in these fisheries (spatial closures, mesh size restrictions, etc.), specific, detailed fisheries management plans do not exist.

Other points to note regarding the monitoring of the industrial fisheries in Bangladesh include:

- Flewelling (2000) reports that industrial operators are obliged to maintain three vacant berths for trainees from the Marine Fisheries Academy aboard their vessels¹⁹, an arrangement that allows for effective at-sea training.
- It is reported that the district office in Chittagong conducts dockside inspections for the industrial fleet.²⁰
- The law provides for onboard observers, but there is currently no programme in place. There are neither at-sea inspections nor VMS in place, reportedly due to lack of operational means.
- Fishing Masters are requested to fill in logbooks, which are returned to the authorities for the purpose of developing catch statistics.
- Coast Guard and Navy are listed as support agencies, which can intervene in the fisheries law enforcement process.
- It is reported that penalties for non-compliance are applied in this sector.

With respect to artisanal fisheries, DOF officials report that management and legal provisions are not implemented in the field, partly due to weaknesses of the Ministry responsible for vessel registration.²¹ There are many fishing gears deployed that violate mesh size rules and other applicable restrictions. Closed areas are not actively policed, and licensing is not enforced. Vessel registration papers are a pre-requisite for obtaining a fishing license, creating a bureaucratic impasse that has led to an entire sector operating without licenses. This stands in diametric opposition with the legal provisions for licensing in the artisanal fisheries.²² Discussions and trials concerning community-based fisheries management (CBFM) have been initiated under a joint FAO/UNDP initiative, but are not yet applied.

In practical terms, there appears to be little to no law enforcement in the artisanal fisheries. DFOs and UFOs do not have delegated authority to enforce the law in the field, this task falling under the central authority of the “Marine Wing” of the DOF. In consequence, marine artisanal capture fisheries can be portrayed as open access, unregulated, multi-gear and multi-species fisheries.

The Bangladesh Fisheries Research Institute (BFRI), a quasi-governmental organization, is responsible for fisheries research and development activities. In budget terms it is reported that costs for fisheries research have decreased, possibly due to

¹⁸ Of which 15 have been granted access to the fishery by court order (Personal communication: Dr. Giasuddin Khan, Chief Fisheries Extension Officer, DOF)

¹⁹ One for navigation, one for engineering and one for fish processing

²⁰ The only landing site for the industrial fisheries.

²¹ Ministry of Shipping/Mercantile Marine Department

²² The mechanized gillnet fishery was licensed in part through a DOF-led special initiative, but the non-sustainability of the effort only gave rise to the fact that today some gillnet fishers are licensed, and others are not

One challenge facing Bangladesh, as one of the least developed and poorer countries of the world, is food security. Overfishing and fishing down the food chain exacerbate the food security concerns in the immediate term, and for the future. Discarding, high grading, culling of catches, and capture of high levels of trash fish in both the coastal and offshore fisheries are also factors that may have a significant negative impact on food security in the long-run. These are a few areas where the Government of Bangladesh can take measures to address both sustainability of the marine resources and food security.

The management trends in Bangladesh have not experienced any rapid change due to the lack of funding and resources committed to sustainable fisheries management with the emphasis placed on enhanced production for food security.

the cessation of research vessel operations. Research results are being used to inform management decisions on gear restrictions, such as those being currently envisaged for shrimp larvae collection and the estuarine set bag net fishery (ESBN).

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The budget for fisheries management is reported as not having changed over the last ten years. In relative terms, Bangladesh currently directs some three percent of the total national budget towards the administration of the fisheries sector. In general terms it is reported that the limited funds available to the MOFL is hampering implementation of the management regimes.

Cost recovery is minimal, with no licenses being issued for 94 percent of the marine capture sector (by volume of landings), and hardly any penalties being applied. As mentioned earlier, only industrial trawlers pay licence fees. Taxes are reported as not applying in the fisheries.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Bangladesh is currently not in a position to direct resources, human or financial, to address international initiatives in a substantive manner.

PARTICIPATION IN REGIONAL FISHERY BODIES

Bangladesh is a member of the Bay of Bengal Programme - Intergovernmental Organization (BOBP-IGO). This forum provides the MOFL and the DOF with “*necessary support to conceptualize and implement management approaches in an effective manner*”. Bangladesh is not a member of IOTC, which should be partly attributed to the fact that offshore pelagic resources are neither targeted nor exploited by Bangladesh at this point in time.

No national fisheries data are supplied to regional fisheries bodies.

SUMMARY AND CONCLUSIONS

Bangladesh is one of the least developed nations of this world, in which some ten to fifteen percent of the close to 138 million population is dependent on fisheries, and where fisheries is generally considered as the last bread-earning alternative for the poorest of the poor. Fisheries play a central role in the economy of the country and the food security of the people.

As inland fisheries landings have been reduced by overfishing, pressure on coastal fisheries resources has risen substantially over the last ten years, and coastal resource yields have started to decline substantially. Coastal fisheries, 94 percent artisanal by volume of landings, are mixed in terms of economic entrants (subsistence, mixed and commercial fishers), gears deployed and resources targeted. Access to the fisheries is

open, and though rules are provided in the form of input controls, the implementation of regulations is weak. Offshore pelagic and deeper water resources are unexplored and unexploited. Signals of overfishing and stock exhaustion are perceptible and being reported from the coastal marine capture fisheries.

Inappropriate funding, weak institutional capacity and linkages, and an outdated legal framework all seem to contribute to an apparent paralysis of the fisheries management machinery. Delegation to, and empowerment of the DFOs and UFOs would be one way to bring fisheries management to the shoreline, and to start the process of administering the fisheries as provided for by the law.

In addition, the intricacies of rural livelihood strategies, the migration patterns, and the resource exploitation patterns within Bangladesh indicate the need for an integrated natural resource management plan, with marine capture fisheries being an inherent part.

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APPENDIX TABLES

Current management of marine capture fisheries

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of managed fisheries over the last ten years
National	<33%	<33%	>66%	unchanged
Regional	<33%	<33%	>66%	unchanged
Local	<33%	<33%	>66%	unchanged

Summary information for three largest fisheries (by volume) for the year 2001/2002

Category of Fishery	Fishery	Volume (mt)	Value* mil USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Commercial	Shrimp trawl	8 553	n.a.	34%	n.a.	No	2 100	44
	Bottom trawl (fish)	16 612	n.a.	66%	n.a.	No	900	36
Artisanal	Mechanized gillnet fishery	193 558	n.a.	59%	n.a.	No	100 000	18 992
	Estuarine set bag net fishery	121 251	n.a.	37%	n.a.	No	100 000	12 765
	Trammel net fishing	9 605	n.a.	3%	n.a.	No	500	1 103
	Shrimp fry collection fishery	2 500	n.a.	<1%	n.a.	No	400 000	None
Recreational	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

n.a. = not available

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

Use of fishery management tools within the three largest fisheries

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights- based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Commercial	Shrimp trawl	Yes	Yes	Yes	Yes	Yes	No	No	No	No
	Bottom trawl (fish)	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Artisanal	Mechanized gillnet fishery	No	No	No	Yes	No*	No	No	No	No
	Estuarine set bag net fishery	No	Yes	No	Yes	No	No	No	No	No
	Trammel net fishing	No	No	No	No	No	No	No	No	No
	Shrimp fry collection fishery	Yes	No	No	No	No	No	No	No	No

*: see footnote 20, page 9

Costs and funding sources of fisheries management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Commercial	Shrimp trawl	Yes	Yes	Yes	Yes	No	No
	Bottom trawl (fish)	Yes	Yes	Yes	Yes	No	No
Artisanal	Mechanized gillnet fishery	Yes	No	Yes	No	No	No
	Estuarine set bag net fishery	Yes	No	Yes	No	No	No
	Trammel net fishing	Yes	No	Yes	No	No	No
	Shrimp fry collection fishery	Yes	No	Yes	No	No	No

Compliance and enforcement within the three largest fisheries

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Commercial	Shrimp trawl	No	No	Yes	Yes	No	No
	Bottom trawl (fish)	No	No	Yes	Yes	No	No
Artisanal	Mechanized gillnet fishery	No	No	No	No	No	No
	Estuarine set bag net fishery	No	No	No	No	No	No
	Trammel net fishing	No	No	No	No	No	No
	Shrimp fry collection fishery	No	No	No	No	No	No

Capacity management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Commercial	Shrimp trawl	Yes	Yes	Decreasing	No	n.a.
	Bottom trawl (fish)	Yes	Yes	Constant	No	n.a.
Artisanal	Mechanized gillnet fishery	Yes	No	Decreasing	No	n.a.
	Estuarine set bag net fishery	Yes	Yes	Decreasing	No	n.a.
	Trammel net fishing	No	Yes	Constant	No	n.a.
	Shrimp fry collection fishery	Yes	Yes	Decreasing	No	n.a.

ANNEX KEY REGULATIONS AND ORDINANCES OF BANGLADESH

Source: FAOLex

- *Shrimp Culture Users Tax Ordinance, 1992*
Date of text: 1992
Abstract: Shrimp cultivation areas developed by the Government by construction of embankments, excavation of canals, or other water management structures, shall be liable to payment of taxes.
- *Protection and Conservation of Fish Rules, 1985*
Source: Bangladesh Gazette, 17 October 1985, pp. 7637-7645.
Comments: This text implements the Protection and Conservation Fish Act, 1950
Abstract: Regulations on protection and conservation of fish. The text contains 11 sections about various measures of protection and conservation and 2 Schedules specifying waters in which the catching of certain fish species is prohibited without a valid licence, specifying fish species of which the catching or sale in certain periods is prohibited, and containing a form of a licence for catching of carps in Prohibited Waters. Regulation 3 prohibits the erection of fixed engines in rivers and canals. No fish shall be destroyed through the use of poison or explosives (regs. 4 and 5). Licences issued under regulation 8 shall be issued only for purposes of pisciculture. Regulations prohibit the catching, carrying, transporting, offering for sale or possessing of frogs.
- *Ordinance to provide for the establishment of a Fisheries Research Institute, 1984*
Source: Laws Regulating Environment in Bangladesh 1996, p. 358.
Date of text: 1984
Abstract: The Ordinance provides for the institution of the Fisheries Research Institute, its functions and tasks.
- *Marine Fisheries Ordinance, 1983 (Ordinance No. XXXV)*
Source: Bangladesh Gazette, 19 July 1983, pp. 4419-4434.
Abstract: This Ordinance has 11 Parts divided into 55 sections, i.e. Preliminary (I); Administration (II); General Provisions Governing Licences (III); Local Marine Fishing Operations (IV); Foreign Marine Fishing Operations (V); Appeal (VI); Prohibited Fishing Methods (VII); Marine Reserves (VIII); Powers of Authorized Officers (IX); Offences and Legal Procedures (X); Rules (XI).
Under Part I, section 3 provides that the Government may exempt any non-mechanized and limited horsepower local fishing vessel from the general provisions governing licences. The Government may also determine a specific zone in which only the aforementioned vessels may engage in fishing operation (sect. 3(2)). Part II is devoted to administration. Under Part III fixing the general provisions governing licences, licences are not transferable except with written permission of the Director and the holder of a licence has a duty to provide information regarding catch. In order to be issued a licence, local fishing vessels shall be registered and shall have been inspected (Part IV). Fishing operations conducted by foreign fishing vessels are subject to prior authorization (Part V). Decision made by the Director or a fisheries officer can be appealed against (Part VI). Prohibited fishing methods are set out in Part VII and include use of explosives, and use of fishing nets with unlawful mesh size. For conservation and management purposes, the Government may declare any area of the Bangladesh fisheries waters and any adjacent or surrounding land to be a marine reserve (Part VIII). Part IX and X deal with powers of authorized officers and offences and legal procedures respectively. Lastly, Part XI sets out the matters upon which the Government is authorized to make rules.
- *Marine Fisheries Rules, 1983*
Abstract: These rules are made under the Marine Fisheries Ordinance (No. XXXV

of 1983). They regulate the issuance and conditions of fishing licences for national and foreign fishing vessels, determining licence conditions, allowed fishing gear, mesh size, etc. Licences, unless determined otherwise in an individual licence, shall expire on 31 December of the year of issuance. Allowed fishing areas are determined according to type of fishing gear used, for example, for fishing with set bag nets, up to 40 meters depth in marine waters at high tide. Model application forms for licences as well as an obligatory catch record form are annexed to the text.

- ***Protection and Conservation (Amendment) Ordinance 1982 (Ordinance No. LV)***
Source: Bangladesh Gazette, 15 December 1982, pp. 4991-4993.
 Long title: An Ordinance to further amend the Protection and Conservation of Fish Act, 1950.
Abstract: The amendments mainly concern definitions and technical matters. A new definition of fish is given: “fish” includes all cartilaginous, bony fish, prawn, shrimp, amphibians, tortoise, turtles, crustacean animals, molluscs, echinoderms and frogs at all stages in their life history. (11 sections)
- ***Territorial Waters and Maritime Zones Rules, 1977***
Source: Bangladesh Gazette, 8 February 1978, pp. 473-477.
Abstract: These Rules implement Act No. XXVI of 1974 noting the declaration of the territorial waters and maritime zones. The 16 sections regulate conduct of foreign ships in territorial waters, activities in the economic zone and on the Continental Shelf, the application of custom and fiscal laws to the economic zone.
- ***Allocation of functions to the Ministry of Fisheries and Livestock (Schedule 1 of the Rules of Business, 1975)***
Abstract: This Schedule defines the functions of the Ministry of Fisheries and Livestock relative to fisheries. Functions include: preparation of schemes and coordination of national policy in respect of fisheries; prevention of fish diseases; development of fisheries resources; management of fish farms and conservation of fish; refrigeration and cold storage; issuing licences to fishing vessels; fishing and fisheries beyond territorial waters; feasibility studies and research on fisheries.
- ***Bangladesh Fisheries Development Corporation Act, 1973***
 Date of text: 1973-09-21
Abstract: A Corporation by the name of the Bangladesh Fisheries Development Corporation is established for purposes of development of the fishing industry of Bangladesh. “Fishing industry” includes also fish processing and marketing. The Corporation shall have the power to: (a) establish units for fishing, and for the preservation, processing, distribution and marketing of fish and fish products; (b) to advance loans to the fishing industry and cooperatives of fishermen; (c) encourage establishment of such cooperatives; (d) undertake monitoring of fish resources; (e) set up organizations for the exportation of fish and fish products, etc. The management of the Corporation shall be vested in the Board of Directors to be appointed by the Government. The Government may make rules for carrying out the purposes of this Act.
- ***Government Fisheries (Protection) Ordinance, 1959***
Abstract: The abstract is divided into ten sections: 1) Short title, extent and commencement; 2) Definitions; 3) Declaration of a fishery to be a khas managed fishery; 4) Bar to unauthorized fishing in khas managed fisheries; 5) Carrying of valid licence of fishing and production of the same; 6) Bar to unauthorized fishing in other fisheries; 7) authorization by Government to question illegal fishing; 8) Exemption; 9) Penal clauses; 10) Rule making power.
- ***Protection and Conservation of Fish Act, 1950 (East Bengal Act 18 of 1950)***
 Long title: An Act to provide for the protection and conservation of fish in Bangladesh.

Comments: The Act has been amended by the East Pakistan Act II of 1964 and the East Pakistan Ordinance No. 26 of 1970, Ordinance No. LV of 1982.

Abstract: The text of the Act consists of nine sections: Short title, extent and commencement (1); Definitions (2); Power to make and apply rules, power to permit catching of fish for certain purposes, provision for seizure, removal and forfeiture of fixed engine, forfeiture and disposal of fish (3); Power to prohibit sale of fish (4); Penalties (5); Arrest without warrant, detention of arrested person (6); Cognizance of offence (7); Officers to be deemed public servants (8); Indemnity (9).

Pursuant to section 3 the Government may make rules with respect to matters of fish resources conservation specified in the section. The Government may also, by Notification in the Official Gazette, prohibit for a specified period the sale and related activities of fish under the prescribed size of any prescribed fish species (sect. 4). Section 5 provides for penalties for the breach of rules made under section 3 and 4. Sections 6 to 9 make provision for arrest without a warrant, detention of an arrested person, legal proceedings, and powers of Fishery Officers.

Country review: India (East coast)

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December 2003

INTRODUCTION

This review is concerned with the Eastern States of India¹, facing the Eastern Indian Ocean. The States are Tamil Nadu in the south-east, Andhra Pradesh and Orissa further north, and West Bengal, bordering with Bangladesh. Included are the Union territory of Pondicherry², and the Andaman and Nicobar Islands (A&N Islands) in the Bay of Bengal.

India is one of the largest countries in the world, with a combined coastline of 8 041 km in length, and an EEZ of 2.02 million km² (FAO, 2000). With a land area of 3.3 million km², India is referred to as a sub-continent in its own right. India is bordering with Pakistan in the north-west, China in the north, Nepal, Bhutan, Bangladesh and Myanmar to the north-east. The Ganges drains a substantial part of India's northern states, and drains into the Bay of Bengal after passing Calcutta, not far from the border with Bangladesh.

There are marked oceanographic differences between east and west coasts, with the prolific monsoon-driven upwelling system found along India's west coast.³

In mid-year 2002, the population was estimated to stand at 1.03 billion people. 28 percent of the population lives in urban centres, illiteracy is high at 41 percent, and child malnutrition stands at 47 percent for children under five years of age. 29 percent of the people live under the national poverty line.⁴ 360 million live in coastal areas, and 6.7 million are fishermen, including, full-time, part-time and occasional fishermen (Vivekanandan, 2002). About 2.4 million are employed full-time in marine capture fisheries (Flewwelling, 2000). Fishing communities generally rank amongst the poorest in India (GoI, 2001). Just over one third of full-time fishermen are located on India's east coast, and 70 percent of the marine fish production originates from the west coast.

India's economy has shown good long-term growth, with an average growth rate of 5.6 percent for the decade leading up to 1992, and 6.1 percent during the decade to 2002. The structure of the economy has changed over the last 20 years, with the agriculture contribution to GDP falling from over one third in 1982 to only one quarter in 2002, and the service sector growing from 37.2 percent in 1982, to 49.2 percent in 2002 – representing now virtually half of India's economy. The contribution

¹ Note: The information for this paper was gathered from many multi-media sources, the internet, and papers, some published and some being "grey literature", but a key source was a 53 page FAO Questionnaire sent to fisheries contacts in each country to assist them in formatting their responses. Data provided in these questionnaires comes from officials and Department's files, and was reported "personal correspondence and discussions with Department officials". The authors wish to express their gratitude to Mr. Sebastian Mathew of ICSF, who: (i) contributed a significant amount of background information for this review, and (ii) patiently answered many questions concerning a host of facets of Indian fisheries management.

² Coastline of only 45 km.

³ Inshore areas (<50m depth) of the east coast only yield 66% of the fish per unit area (5.9 t/km²), when compared to west coast areas (8.8 t/km²).

⁴ Source: World Bank online database; www.worldbank.org/data/countrydata/countrydata.html

of the manufacturing industry to the economy has remained stable at roughly 26 percent throughout this period. Exports of marine products have quadrupled, growing from US\$313 million in 1982 to US\$1.2 billion in 2002.⁵

POLICY FRAMEWORK

Unlike most other developing countries, India has never signed a fisheries access agreement with a distant water fishing nation (DWFN), and has persisted for decades in its attempts to develop its own offshore industrial fisheries by nationally-owned interests. With respect to marine capture fisheries, the inshore fisheries have always been the most important sub-sector, both in terms of catch and numbers of people depending on the fisheries.

State and Government policy focuses on developing fisheries at all levels, with the aim to sustain or increase production and to guarantee continued growth of the sector. Modernization of the fleet and upgrading of infrastructure receives attention through subsidies, though amounts are modest, and one-time payments. This production-oriented focus applies especially to the activities of the Ministry of Agriculture and related Departments responsible for capture fisheries, at both Union and State levels, with significant variations across States and Union territories.

Interestingly, India is one of the world leaders in terms of establishing associations and societies formed by fishing communities, workers, and other stakeholder related to the sector.⁶ These organizations develop and defend positions, publish findings, and influence authorities on policy formulation and management options. Government encourages the formation of associations in all sectors (aquaculture, inland fisheries, mariculture, coastal fishing, offshore fishing, etc.) in order to put in place an enabling framework to engage in discussions with stakeholders, to receive realistic reports of field activities, constructive recommendations for strategy and policy formulation, and to receive feedback on government proposals.

India distinguishes between two types of marine capture fisheries, each one ruled by its particular legal regime. These are: a) coastal fisheries, and b) deep sea fisheries. Coastal fisheries fall under State jurisdiction, and take place within the first 12 nautical miles from the base line out to sea. Deep-sea fisheries are those operations taking place between 12 nautical miles and the outer boundary of the EEZ, falling under the jurisdiction of the Union Government. In practical terms, most coastal fishing operations take place in waters less than 50 meters in depth, and are carried out from small-scale vessels, generally less than 20m LOA. Deep sea fishing is generally meant to indicate industrial operations, but in practical terms, some small-scale craft targeting particular resources are found to operate all the way to the outer boundaries of the EEZ.

Coastal Fishing Policy

Coastal Fishing Policy is defined by an open access regime, which has given rise to a sector with many entrants exploiting coastal marine resources to their full potential. The current legal framework provides for conflict minimisation between traditional and industrial sub-sectors, with little emphasis on sustainable management of the resources.⁷

⁵ *Ibid.*

⁶ A selection of associations and societies across the whole of India, to show the diversity include: Indian Fisheries Association, Mumbai; Inland Fisheries Society of India, West Bengal; Society of Fisheries Technologists (India), Cochin; Marine Biological Association of India, Cochin. The Asian Fisheries Society, Indian Branch, Mangalore; Seafood exporters Association of India; Association of Indian Fishery Industries; All India Shrimp Hatcheries Association; Kerala Fishermen Welfare Fund; Confederation of Fish Farmer's Welfare Associations; National Fishworkers' Forum (to protect the interests of fishworkers and mechanized boat operators).

⁷ See: Section 3.

Government has initiated a range of schemes that aim to develop and modernize the traditional inshore sector. Modernisation focuses on improvements to: a) types of fishing craft used, replacing old and heavy materials with newer, more durable and lighter ones, b) materials used in fishing gears, such as nets, and c) motorization and mechanization⁸ of the fleet.

Vivekanandan (2002) lists five separate, centrally-funded programmes to develop coastal marine fisheries. It must be noted though, that the scope of these programmes are subject to budget constraints, and may not necessarily represent significantly large programmes:

- assistance to fishermen for the motorisation of traditional craft (subsidies),
- introduction of plywood and intermediate craft,
- reimbursement of central excise duty on HSD oil⁹ used in mechanised vessels,
- assistance to maritime state governments to enforce fisheries regulations (providing patrol boats), and
- resource enhancement through creation of artificial reefs and subsidisation of mariculture

In addition to this, Government supports the construction of major and minor fishing ports, bearing all the costs of major developments, and entering cost-sharing arrangements with State Governments for smaller projects. Welfare of coastal fishing communities is one of the objectives of fisheries development. Attention is also directed at the post-harvest sector through programmes to strengthen fish marketing infrastructure. This included facilitating the acquisition of cooling vans, cold storage, ice plants, bicycles, etc.¹⁰

Coastal Fishing Policy is thus production and export oriented and under the control of State Governments with support from the National/Union Government.

Deep-Sea Fishing Policy

Deep-Sea Fishing Policy is the responsibility of, and developed by the Union Government.¹¹ Since the declaration of its EEZ in 1976, the intent was to develop its own deep-sea fishing capacity. This was attempted through a series of joint ventures that have not been successful. The first deep-sea policy was announced by Government in 1977, providing for chartering arrangements with foreign operators. The 1981 Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act requires 60 percent of capital to be held by Indian citizens in joint venture companies, and an obligation to train Indian fishermen. A newer Deep Sea Fishing Policy was developed in 1986, and was revised in 1991.¹² This policy was rescinded by Government in September 1996, under pressure of the National Fishworkers' Forum (NFF), highlighting serious conflicts between the domestic small-scale and industrial joint venture fleets.¹³

In late 2002, a new set of Guidelines for deep-sea fishing was announced by the Government. The focus now lies on the registration status of vessels, rather than mode of acquisition of vessels under charter arrangements and joint ventures – as was the case under previous policies. In combination with new legislation ruling foreign

⁸ Within the Indian context, “motorization” refers to out-board engine propulsion, replacing or adding to sails and oars of traditional craft, while “mechanization” refers to the operation of fishing crafts through inboard engines. In motorized craft, fishing operations are carried out manually.

⁹ High speed diesel oil used for fuel

¹⁰ This particular programme is an initiative of the Marine Products Export Development Authority (MPEDA), functioning under the Ministry of Commerce and Industry.

¹¹ See: Section 3.

¹² This policy permitted up to 51% foreign share capital in fishing companies, inconsistent with the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981.

¹³ A strike prompted the Government to constitute the Murari Committee in 1995, which recommended that the deep sea fishing policy of 1991 be called off.

investments, fishing companies with 100 percent foreign-owned capital may now register as Indian companies and fly the Indian flag.^{14,15}

Under the new 21-point Guidelines there are no obligations to land catch in India, to train Indian crews, and to pay license fees commensurate with the value of targeted catches. Therefore, potential benefits for the economy and fishing interests of India remain completely indistinguishable (Mathew, 2003). Further, the Guidelines do not reflect the new deep-sea fishing policy proposed by the Gopakumar Committee Report,¹⁶ which awaits formal Government acceptance. This means that by the end of 2003, the deep-sea fishing sector has been evolving in a policy vacuum for more than seven years.¹⁷

Fisheries policies of India have been developed with few linkages between the sectors, based on dated legislation, and focused on increased production with little emphasis on conservation, sustainability or responsible fisheries management

LEGAL FRAMEWORK

The various facets of marine capture fisheries and marine habitat fall under the responsibility of several agencies and Ministries, at both the Union Government and State levels. Items on List I (Union List) are dealt with by the Union Government, and items on List II are dealt with by State Governments. List III contains a list of items which fall under the shared responsibility of both the Union Government and the States (Concurrent List), and both the Indian Parliament and the State Legislatures have power to pass laws regarding these items. The Lists are enshrined in the *Constitution of India*. Table I provides a summary overview of core items related to marine capture fisheries, presenting the agencies/Ministries responsible for legislating and implementation.

There are no legal provisions in place below State level to legislate for fisheries management at the local level. As noted by Matthew (2003), most vessels either have a sharing arrangement between capital and labour or an incentive system for workers. The sharing system is the norm in India as opposed to wages and is unique in that it can include all members of a fishing crew, whether or not they fish, widows of former crew members lost while fishing and even down to the village barber.

The current legal framework for fisheries hinges around a series of Acts, which do not directly deal with, or simply fail to mention the sustainable management of fisheries resources. The only Indian legislation mentioning “undertaking measures for the conservation and management of offshore and deep-sea fisheries” is the Marine Products Export Development Authority Act of 1972 (Mathew, 2003).¹⁸ Although the Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act that followed in 1976 recognizes the sovereign rights to conservation and management of living resources in the Indian EEZ¹⁹ as well as providing Central Government with the power to legislate for the conservation and management of

¹⁴ The Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, in force since 1981, defines an Indian fishing vessel as any vessel, which is owned by a company in which not less than 60% share capital is held by citizens of India. This gives rise to an inconsistency in the legal substance ruling ownership and registration of fishing vessels owned by companies with more than 40% foreign share capital.

¹⁵ This enables, for example, a tuna fishing company from Taiwan to register as an Indian company, while also being registered as a fishing company in Taiwan.

¹⁶ In 1999, an expert group led by K. Gopakumar, then Deputy Director of Fisheries, Indian Council of Agricultural Research, was constituted to elaborate a comprehensive marine fisheries policy. The report was submitted to the Government in late 2001.

¹⁷ See: Legal Framework

¹⁸ See: Marine Products Export Development Authority Act, 1972. Section 9 (2)(a).

¹⁹ See: Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976. Section 7 (4) (a).

TABLE 1
Marine fisheries-related areas of competence

Item	Agency/Ministry/Department
<ul style="list-style-type: none"> • Deep Sea fishing (List I) • Survey & assessment of fisheries resources • Research • Training & extension • Aquaculture development 	Ministry of Agriculture / Department of Animal Husbandry and Dairying
<ul style="list-style-type: none"> • Monitoring of fishing by foreign vessels (List I) • Prevention of marine pollution by ships • Protection of endangered species (Wildlife Protection Act, 1972) 	Ministry of Defence / Coast Guard
<ul style="list-style-type: none"> • Fish processing • Processing units 	Ministry of Food Processing
<ul style="list-style-type: none"> • Seafood exports (List I) • Quality control 	Ministry of Commerce & Industry / Marine Products Export Development Authority (MPEDA) Export Inspection Council (EIC)
<ul style="list-style-type: none"> • Law of the Sea negotiations (List I) 	Ministry of External Affairs
<ul style="list-style-type: none"> • Potential fishing zones • Monitoring ocean pollution 	Department of Ocean Development (DoD)
<ul style="list-style-type: none"> • Fishing vessel industry (List I) • Major fishing ports (List I) • Minor fishing ports (List II) 	Ministry of Shipping
<ul style="list-style-type: none"> • Aquaculture in territorial waters (List II) • Fisheries in territorial waters (List II) 	State Government / Department of Fisheries
<ul style="list-style-type: none"> • Protection of marine biodiversity (List III) • Protection of coastal habitats (List III) • Focal point for Ramsar, CITES, CMS & CBD Conventions (List III) 	Ministry of Environment and Forests (MoEF)

the marine living resources within the EEZ,²⁰ the ensuing Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act of 1981, and its regulations of 1982,²¹ do not mention conservation or management of fisheries resources (Mathew, 2003).

Since maritime States are responsible for marine fisheries legislation within the territorial sea²² (List II item; *see* table 1), States proceeded to develop their own Maritime Fishing Regulation Acts and Regulations.²³ The driving force behind these Acts was the rising number of serious conflicts between artisanal fishermen and trawlers. The ensuing Acts and Regulations focused principally on provisions enabling the regulating of fishing vessel operations and movements in the territorial sea, aiming at protecting traditional fishermen, and maintaining law and order. This legislation failed to provide for limited access, effective legal action against infringements, and inter-State vessel movements (Mathew, 2003). The West Bengal Act did not provide for a protected exclusive zone for traditional craft operations, which is given in the other three States; the reason being that few conflicts between traditional fishing vessels with trawlers exist, trawling being undertaken in waters further offshore. Some Acts also left fisheries officers with discretionary powers in granting fishing licenses for motorized

²⁰ *See*: Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976. Section 15 (c).

²¹ Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Rules, 1982.

²² In 1967, India proclaimed a territorial sea of 12 nautical miles instead of six, by Presidential Proclamation, revoking the previous proclamations of 1956 concerning the territorial sea and the contiguous zone.

²³ *e.g.* West Bengal Marine Fishing Regulation Act, 1993 – “An Act to regulate fishing by fishing vessels along the coast line of the State”. Karnataka Marine Fishing Regulation Rules, 1987 – implementing the provisions of the Karnataka Marine Fishing Regulations Act, 1986.

vessel owners and assigning areas of operation.²⁴ Under this system of Union Acts, State Acts and Regulations, legislative frameworks have evolved with respect to fisheries production but not with respect to the sustainable management of fisheries.

The absence of legislation relating to the planning and implementing of responsible fisheries management leaves the executive arms of Ministries and Departments at Union and State levels in a considerable legal void.

It is reported that mechanisms for consultation and the involvement of stakeholders in the management process do exist. Co-management arrangements are being actively discussed (Kurien, 2000), and partly applied, even if not formally enshrined in the law.²⁵ It is also reported that more than 2/3 of fisheries are managed in some way and input controls are part of legislation. However, the effectiveness of implementation is subject to debate and examples of some of the more important fisheries that remain in need of management efforts include shark and sea cucumber fisheries.²⁶

STATUS OF THE FISHERIES

It is important to note that next to marine capture fisheries, there are important freshwater fisheries and freshwater and marine aquaculture sectors operating in India. In 2001, overall fish production stood at 6.0 million tonnes, accounting for approximately four percent of the world production. Of which, marine, freshwater, and aquaculture production levels were 2.9, 0.98, and 2.1 million tonnes, respectively (FAO FishStat).²⁷ In that year, marine capture fisheries represented 48 percent of the overall national fish production and marine capture production from the east-coast States represented 48 percent (.94 million tonnes) of marine capture production.²⁸ However, in the 2001-2002 period, the four east coast states produced 95 percent of the national cultivated shrimp production (MPEDA, 2002).

India's fisheries are characterised by marked differences between west and east coast in terms of numbers of fishers, and distribution of assets. The eastern seaboard counts for 55 percent of the total number of fishing vessels, while the western seaboard counts for 65 percent of the total active fisher's population.

India's fisheries are small-scale in nature. On the eastern seaboard, some 70 percent of all vessels are non-motorized and face stiff competition from mechanised operations. Vessel sizes range from 5 m LOA to 30 m LOA, with most vessels less than 20 m LOA. The fisheries are difficult to categorise, and boundaries between subsistence, artisanal and small-scale commercial are fluid.²⁹ Vivekanandan (2002) splits the fisheries into *mechanized* and *artisanal* sectors. Mechanized vessels have inboard engines and are used for purse-seining, longlining, gillnetting and trawling operations.³⁰ Artisanal craft

²⁴ e.g. Goa, Daman and Diu Marine Fishing Regulation Rules.

Section 3. Application for licensing of fishing vessels under section 6. - (1) Every owner of a fishing vessel which is mechanically propelled shall make an application accompanied by a license fee of Rs. 205/- to the authorized officer, for the grant of a license for using such fishing vessel in the specified area in Form A. (2) The authorized officer shall, while granting or refusing the license, apart from the conditions specified in clause (a), (b) & (c) of sub-section (4) of section 6, have regard to the number of fishing vessels already licensed in the area where the fishing vessel is sought to be operated. (3) If the authorizing officer, after making such enquiries as deemed fit, decides to grant the license applied for, he shall issue the license in Form B, which shall be valid for a period of one year the date of issue. (4) The authorized officer, having regard to the area in which the fishing vessel is sought to be operated, may direct the applicant to deposit an amount which shall be no less than Rs. 210/- but not more than Rs. 250/- as security for the due observance of the conditions of the license.

²⁵ Source: Government of India

²⁶ Ibid.

²⁷ Data are also available from Agricultural Statistics at a Glance. <http://agricoop.nic.in/agristatisticsnew.htm>

²⁸ Including the A&N Islands, making up 6% of overall national catch.

²⁹ In actual fact, a significant portion of subsistence fishing in India is conducted in the inland sector.

³⁰ Dolnets (fixed bagnets) are popular, and are deployed to catch the Bombay duck. These are only found in the north-west of India, along with this particular resource.

on the east coast consist of catamarans and plank-built boats.³¹ This coastal, small-scale sector (mechanized and artisanal combined) contributes the bulk of the marine catch.³² Only one percent of the marine catch originates from vessels more than 20 m LOA (Mathew, 2003).

In 1991, the Ministry of Agriculture estimated the total MSY for the marine waters of India to be approximately 3.9 million tonnes; of which 2.2 million tonnes from inshore waters (<50m depth), and 1.2 million tonnes from offshore grounds. The marine capture fisheries production of 2000 stood at 2.75 tonnes, of which 0.5 tonnes were estimated to have originated from offshore operations (>50m depth).³³ This implies that inshore MSY levels as established by Government have been reached sometime after 1995³⁴ for the inshore zones, and that these resources are fully exploited. It would also imply that potential offshore resources of some 0.7 tonnes are currently not being exploited.

The status of inshore resources is portrayed as fully exploited, or overexploited, with possible room for expansion offshore.³⁵ Contributing factors are the large number of entrants into the fishery under the “open access” regime, and the adoption of modern fishing craft and gears that are ever more efficient at catching fish. Ubiquitous use of illegal mesh sizes is reported, as well as the ever-increasing deployment of bottom trawling operations. This leads to unequal “vertical” exploitation of coastal water column, meaning that demersal species suffer more from fishing mortality than pelagic assemblages, which are fished by a whole range of different gear types, more selective at targeting specific species. Currently, and nation-wide, only clupeids, carangids, and silverbellies are thought to be able to sustain significant production increases (Vivekanandan, 2002).

The main stocks exploited on the east coast³⁶ include: lesser sardines, silverbellies, penaeid shrimps, sciaenids, *Hilsa* spp., catfishes and perches (Vivekanandan, 2002). The landings for these seven groups represent 10.06 percent of all India landings, and 26.5 percent of overall eastern seaboard landings.

The following problems have surfaced in a number of inshore fisheries in recent years (adapted from Vivekanandan, 2002):

- decline in catch rates
- declines in recruitment and yield/recruit
- declines in biomass
- shift from the regular landing patterns, and
- changes in biological characteristics of exploited fish populations

These represent clear warning signals regarding the status of fish stock health. Factors causing the above are linked to the following (adapted from Vivekanandan, 2002):

- steep increase in the fisher population, number and efficiency of craft and gears, and associated fishing effort;
- inappropriate exploitation patterns and practices, and
- degradation of coastal habitats (mangroves, coral reefs, etc.) caused by pollution of coastal waters, urbanisation, coastal developments, etc.

The industrial, deep-sea fisheries catches of India are much lower than the coastal fisheries. Under the policy schemes in force since the late 1970s, foreign investments and joint venture companies never flourished, and development of this sub-sector

³¹ Catamarans are mostly replaced by canoes on the western seaboard.

³² 50% of the catch stems from bottom trawling operations from vessels less than 16 m LOA.

³³ This estimate however, is not verifiable, and some authors believe that much less than 0.5 tonnes originates from offshore operations. This is due to inherent flaws in the data collection systems in place.

³⁴ Total marine capture: 2.613 million tonnes; with the most important fraction from inshore waters.

³⁵ “offshore” meaning in waters beyond the limits of the territorial sea, and in waters deeper than 50 m and beyond the continental shelf.

³⁶ Including the A&N Islands

TABLE 2
Fishers and their catches for the east coast of India

Category of Fishery	Fishery	# of Vessels	# of Fishers	Catch 2000 tonnes	Catch 1995 tonnes	Catch 1991 tonnes
Coastal commercial*	Shrimp	23 966	153 360	80 912	66 987	51 997
	Sardines			48 992	71 343	44 535
	Leiognathids			43 350	58 239	40 116
Coastal artisanal*	Shrimp	112 118	707 300	n.a.	n.a.	n.a.
	Sardines			n.a.	n.a.	n.a.
	Leiognathids			n.a.	n.a.	n.a.
Total		136 084	860 660			

* "commercial" refers to mechanised vessel operations, "artisanal" to both motorised and non-motorised traditional craft operations

Note: n.a. = not available

Source: Government of India

constantly faltered. The main resources are tuna, deep-sea shrimp, lobster, squid, and cuttlefish. There is little available information on the status of the resources, and the operations. It is important to add, that along with technological advances in craft and gear, and with increasing pressures on coastal fisheries, numerous operators of vessels in the 20m LOA class have started to exploit resources far beyond the territorial waters, some operators even leaving the EEZ in search of particular target species. These catches are often reported as "coastal" in origin— due to the size class of the vessel from which catches are landed. Figures for the main coastal small-scale fisheries are summarised in Table 2.

Historically, offshore resources were exploited by joint venture fishing companies from Thailand and Taiwan. At the height of the offshore fisheries, some 200 vessels³⁷ were exploiting offshore tuna resources, and deep water species such as shrimp and lobster. Longlining and trawling (for shrimp and demersals) were the main operations targeting these resources. Following the 1996 abolition of the charter/joint venture system, numbers of industrial scale vessels operating in the EEZ dwindled back to below 60, but have recently picked up again under the new regime governed by the new guidelines on deep-sea fishing, promulgated by Government in late 2002.

The actual catch of offshore industrial vessels, operated by "Indian" companies under 100 percent foreign ownership, is unknown. This is owing to the fact that those vessels can currently land their catch outside India, if so they wish.

The Central Marine Fisheries Research Institute (CMFRI) has estimated tuna stocks available for exploitation at 640 000 tonnes. Little research has been carried out and/or published on the other resources.

MANAGEMENT ACTIVITY

Fisheries-specific management activity remains limited in India – partly owing to lacking legislation to provide a clearer mandate and structure of fisheries management. Overall, the Indian tool-box of fisheries management contains little more than a few basic measures, essentially confined to minimum gear specifications, seasonal and spatial ground closures, and the harvesting and size restrictions for protected species. Measures to minimize gear conflicts between different types of fishing operations are being implemented³⁸, but enforcement of other management measures is weak. Inter-State variations also exist, e.g., in Tamil Nadu and Orissa, a 5 km zone is reserved to traditional craft operations; in Andhra Pradesh, a zone of 10 km is reserved; and no provisions have been made for a protected traditional fishing zone in West Bengal.

³⁷ 149 Taiwanese joint venture vessels operated in the Indian EEZ from 1985 to 1993.

³⁸ Based on the fact that the enacting of the State Marine Fishing Regulation Acts was particularly motivated to address this issue. See Section 3, 4th paragraph.

Closed seasons differ between western and eastern seaboard. The west coast observes a closed season for mechanized craft which is declared on a yearly basis with the onset of south-west monsoon activity, and lasts throughout the period. Tamil Nadu and Andhra Pradesh on the east coast observe a set period of 45 days, during April-May, and this only since 1999 and 2001, respectively (Vivekanandan, 2002). This is a measure which aims at protecting stocks during their most sensitive phase of the annual reproductive cycle (Vijayan & Edwin, 2001).

Ground closures or zoning relates more to the declaration of marine protected areas and conservation initiatives, and will be dealt with in more detail under section 7.

The Fisheries Survey of India (FSI) agency within the Ministry of Agriculture is responsible for mapping and assessing the extent of fish stocks. Activities are troubled by budget limitations. The CMFRI, Kochi, is among a number of Institutes tasked with fisheries research. The CMFRI is tasked with collection and analysis of national catch and landing data.³⁹ These are all linked to the Ministry of Agriculture and the Indian Council of Agricultural Research, New Delhi.

The Ministry of Environment and Forests, which also functions as the national focal point for a number of Multilateral Environmental Agreements (MEAs) such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 (CITES) and the Convention on Biological Diversity, 1992 (CBD), is gradually introducing measures for the protection and management of marine resources (Mathew, 2003).⁴⁰ This stands in contrast with the production and growth oriented policies pursued by the Ministry of Agriculture, other Union ministries and State departments and agencies dealing directly with fisheries. This clearly symbolizes a step forward in terms of legislating for the sustainable management of fisheries resources.

In terms of enforcement, it is to be noted that dockside and landing site inspections are carried out by fisheries officers. Neither a VMS system, nor an on-board observer scheme are in use. The enforcement activity is not portrayed as being stringent enough to provide a strong deterrent effect, or to guarantee reasonable compliance of the various sectors with the fisheries law. Enforcement at-sea is split into two sectors. The State Police is tasked with law enforcement of the territorial sea, using its own set of patrol boats, while the Indian Coast Guard⁴¹ is tasked with patrolling of the EEZ. The agencies responsible for penalty attribution are the respective Departments of Fisheries. Penalties include fines and the revoking of fishing licenses. Fines and the risk of getting caught are generally found too low to represent an appropriate deterrent level to bring about compliance.⁴² Central Government states that offences have decreased over the past decade.⁴³ It is noteworthy however, that all junior officers in the Indian Coast Guard are required to complete six weeks of fisheries-related training as part of their national Coast Guard training. This is a model that can be utilized elsewhere to promote inter-agency cooperation. In this case it is effective at the national level, but does not yet extend down to the national/state levels of management coordination.

Although the Indian Coast Guard are willing to assist and address the MCS concerns in support of management, the lack of effective State and National coordination and

³⁹ url: http://www.cmfri.com/cmfri_frad.htm

⁴⁰ In 2001, ten species of shark and ray and nine species of molluscs, all sea horses, giant grouper, five species each of coral and sea cucumbers, sponges and molluscs, have been brought under the ambit of the Indian Wildlife Protection Act of 1972.

⁴¹ The Indian Coast Guard was established through the Coast Guard Act of 1978 (Act No. 30 of 1978), and operates under the Ministry of Defense. It is also responsible for the protection of marine habitat from ship-based pollution and the protection of species under the Wildlife Protection Act (e.g. turtle protection measures). The Indian Coast Guard is one of the few organizations in any Asian country that requires all junior officers to attend a six week fisheries training course as part of their formal training).

⁴² Source: Government of India

⁴³ Source: Government of India

BOX 1

Dealing with complexity and change in fisheries management: the case of small-scale fisheries in Andhra Pradesh, India

The state of Andhra Pradesh has 900 km of coastline on the east coast of India and an estimated 870 000 fishers living mainly in fishing communities. The communities vary widely with distinctive fishing systems, fish disposal and marketing systems, and social and political organisation. Amongst the many villages are two that provide interesting examples of how traditional community-based fisheries management systems (TCBMS) can regulate fishing practices successfully: Uppada and Boddu Chinna Venkataya Palem (BCV Palem).

In Uppada and BCV Palem, the well-developed TCBMS operate through the traditional Indian village management system known as Panchayats. The specific nature of TCBMS varies between fisheries. In BCV Palem, where fishing activities are carried out by a number of fishing systems confined to the creeks and the backwaters, the traditional systems of management and control related to fisheries and fishing are elaborate and have an important economic function. In Uppada, on the other hand, where there is often considerable competition for space for beach seining which often requires large groups of people, there is a greater emphasis on social issues and relationships.

The community-based nature of fishing occupations in Uppada seems to be a reason for the inclusive nature of its membership. Shore seines, boat launching and lifting, are all more or less dependent on the involvement of a large number of people in the activity. The predominance of small pelagics in the catches means that during certain parts of the year, the entire community has to work as one unit to be able to dispose of the fish properly. Membership of the Panchayat is not exclusive and outsiders are able to join.

In BCV Palem, where fishing pressure in the shallow creek waters was higher and boundary conflicts more likely, the existence of use rights that are shared equally amongst the members has meant that there are more incentives to keep people out than in.

So why have TCBMS survived in Andhra Pradesh and why have they been so successful at managing fishing activity? First, they are directly connected to the specific conditions of natural and social environment in the area and so are flexible enough to cope with change and locally relevant so as to engender support. Panchayats are holistic and cross-sectoral – they develop systems that emphasise secure, sustainable and equitable access to resources and do this through the integrated and holistic nature of the systems of governance concerning resource allocation. Finally, the decision-making process is participatory.

First, the dynamic nature of the whole fisheries environment (resource, habitat, markets etc) highlights the need to design resilient systems that can cope with change. Second, the need to integrate fishery management systems into the wider socio-economic environment, either at regional or national macroeconomic levels. Third, the issue of appropriate scale: locally-based community management systems work well provided that the national (or regional) authorities play their role of overseeing the whole system. Such local initiatives are vulnerable to activities beyond their scope. The scale of the management system must be commensurate with the scale of the resource. Fourth, the case-study also demonstrates that the participation of stakeholders enhances respect for institutions and increases compliance, making the enforcement problem more tractable. Stakeholders participation and sustainability will be influenced by the degree of equity within the management system and the level of security of rights.

Source: Extracted from SIFAR, 2004.

cooperation mechanisms in the respective jurisdictions create difficulties. This has not changed in the past five years despite regional training exercises by FAO.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Government reports that the overall national budget for fisheries management has decreased over the last ten years. Costs related to MCS and conflict management are said to have increased, and likewise, Government perceives the financial means directed at MCS as adequate.

License fees are levied in the mechanised sector, but fees are low, as are penalties applied for fisheries offences. These sources of revenue do not represent a serious contribution to the overall cost Government faces for the management of the resource.

Fishermen cooperative societies are exempted from income tax. Perhaps, the most important reasons for this exemption are the following:

- farmers are exempted from income tax, and fishing activities considered at par with farming operations are also exempted;
- costs of collecting taxes in a highly atomised sector like the Indian fisheries sector may not justify the revenue that could potentially be collected.

Seafood exporters were exempted from income tax until recently. Exports (all agricultural commodities exported, including seafood) are charged a cess of 0.3 per cent of the FOB value of seafood exports, having been reduced from 0.5 per cent initially. The collected tax is used for financing the Marine Products Export Development Authority (MPEDA), and currently stands at about 4 million US\$ *per annum*. Import tariffs on seafood were 60 percent until recently; but these were reduced to 30–35 percent in 2002–03.⁴⁴ India imports very little fish, unlike China or the Philippines.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

India reports to have taken up some of the challenges represented by a host of International Programmes of Action (IPOAs) that have been launched by FAO over the past few years.

While by-catch of seabirds is perceived as a minor problem in Indian fisheries, ten species of endangered shark have come under the ambit of the Indian Wildlife Protection Act of 1972 (see footnote 43), and research programs are being directed at this particular resource.⁴⁵ A sub-group has been constituted to assess fishing capacity, and the Government intends to have capacity measured by 2005. In addition to this, the new deep-sea policy is mentioned in the capacity study, and is expected to address these issues.

The extent of IUU fishing and related problems is to be assessed by a sub-group, with the inputs of an FAO needs assessment study into IUU fishing in India (FAO, 2001b). The dual registration and flag hopping for foreign vessels registered under Indian companies have not been addressed.

In 1997, India declared a Marine Sanctuary in the east coast State of Orissa. Gahirmatha is the largest known rookery of the olive ridley turtle in the world. The Sanctuary was declared in the wake of the 1996 United States ruling on the mandatory use of turtle excluder devices (TEDs) for fisheries targeting US export markets.

There are a number of initiatives started under MEAs, reflecting India's interest and participation under international agreements. Not yet mentioned, and closely linked to coastal fisheries are India's activities with respect to the Jakarta Mandate (CBD).⁴⁶

⁴⁴ Source: Sebastian Mathew, personal communication.

⁴⁵ Source: Government of India.

⁴⁶ The Jakarta Mandate on Marine and Coastal Biological Diversity was adopted in 1995. It has a component on fisheries in coastal areas. To assist the implementation of the Jakarta Mandate at various levels, the CBD adopted a programme in 1998 on integrated marine and coastal area management, the sustainable use of living resources, protected areas, mariculture and alien species.

The all-India Coordinated Project for the Conservation and Management of Coastal and Marine Biodiversity was launched in 1999-2000, as well as a coral reef monitoring programme.

PARTICIPATION IN REGIONAL FISHERY BODIES

India is party to a host of regional bodies, programmes and projects dealing with fisheries management and the protection of coastal habitats, communities and resources. The regional fisheries bodies that include India are listed in the annex in Table 7. India reports it collects data in formalised data collection schemes, and to regularly feed back due data to these regional bodies.

Beyond the regional fisheries bodies listed in Table 7, India participates in a host of programmes, inter-governmental and regional organisations that also deal with the management and conservation of fisheries resources, or the trade of fisheries products. These include the following:

- Bangladesh-India-Myanmar-Sri Lanka-Thailand Economic Cooperation (BIMST-EC)
- Bay of Bengal Large Marine Ecosystem (BOBLME)
- Bay of Bengal – Inter-Governmental Organisation (BOBP-IGO)
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Indian Ocean Rim Association for Regional Cooperation (IOR-ARC)
- The South Asian Association for Regional Cooperation (SAARC)

SUMMARY AND CONCLUSIONS

India is a very large country with an EEZ of 2 million km², a continental shelf of some 500 000 km², and ranks as the world's fourth-largest fish producer, after China, Peru and Japan. Marine capture fisheries contribute less than half of the national fish production (48.7 percent in 2000), the remainder coming from inland fisheries, inland aquaculture and brackishwater aquaculture. Shrimp currently represents the single largest foreign currency earner as an export commodity.

Coastal resources are described as overfished, and the open access regime is identified as one of the core reasons for the current situation. In excess of 90 percent of the catches are being harvested from coastal waters with approximately one dozen species making up the majority of these captures. Bottom trawling operations using vessels less than 16 m LOA take 50 percent of the catches. The sector is modernising with increased mechanisation, but traditional small-scale craft stall remain responsible for these large catches. The east coast sector is modernising at a slower pace.

Offshore fishing, or deep sea fishing, is still very much under-utilized in India. It is thought that another 0.7 million mt of untapped resources could be harvested from India's EEZ, outside the territorial waters, but the lack of a coherent policy on deep sea fishing is required to promote this sector.

Employment, increased production, welfare of fishermen and increased export earnings are the main aims pursued by the Government in its recent five year plans. Efforts aimed at fisheries focus on infrastructure enhancement (ports and post harvest facilities) and modernisation of the fleet implemented through direct investments and subsidy schemes. Much less effort is aimed at resource appraisal, management and conservation of the resources.

No single Ministry is responsible for managing the fisheries sector. The lack of an overarching and coherent policy for coastal and deep-sea capture fisheries contributes to the weak structure of the sector. The current legal framework is dated, production oriented, and fails to provide a clear mandate and a framework for responsible fisheries management. A new legal framework is required to define the objectives of marine resource management for the national and state administrations.

The lack of effective inter-agency coordination and cooperation mechanisms, especially between the States and the National government to address respective jurisdictions of territorial seas and the EEZ significantly weaken the MCS efforts of all agencies, despite the positive step by the Indian Coast Guard of requiring fisheries training for all its junior officers. The Regional and National MCS training efforts of FAO have not yet shown any significant difference in strategies or methods in the implementation of management plans in East India.

Participatory and cooperative activity by fisherfolk in India is very well developed, and represents a most tangible management tool to address access to marine resources and management issues through empowerment of communities. Effective input controls, community-based property rights and co-management schemes are further tools to solve the problems of overcapitalisation and excessive fishing pressure in coastal waters. Diversion of fishing effort to the offshore areas through the use of traditional, motorised, mechanised and sea-worthy craft is another option to be considered. Further, the re-orientation of current fisherfolk towards other fisheries such as the brackish water shrimp culture, especially as practiced on the east coast; inland fisheries; and aquaculture are other options Government could actively investigate.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries in India (East)

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of managed fisheries over the last ten years
National (Union)	>67	<33	>67	increasing
Regional (State)	>67	<33	>67	increasing

Summary Information for three largest fisheries (by volume) in India (East) for 2000

Category of Fishery	Fishery	Volume (mt)	Value* mil USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants (full time)	# of Vessels
Commercial†	Shrimp	80 912	809.12	46.7	89.5	No		
	Sardines	48 992	73.49	28.3	8.1	No	153 360	23 966
	Leiognathids	43 350	21.67	25	2.4	No		
Artisanal	generic♦	n.a.	n.a.	n.a.	n.a.	No	707 300	112 118
Recreational	does not exist	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable

n.a. = not available

† "commercial" refers to mechanised vessel operations, "artisanal" to both motorised and non-motorised traditional craft operations

♦ generic: includes all fisheries in this category.

* Value in 2002 U.S. Dollars

** % values are based on totals for each category of fishery.

Use of Fishery Management Tools within the three largest fisheries in India (East)

Category of Fishery	Fishery	Restrictions				License/limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Commercial	generic	Yes	Yes	Yes	Yes	Yes*	No	No	No	No
Artisanal	generic	Yes	Yes	No	No	No	No	No	No	No

* Most maritime States have provided for licenses for motorised vessels in their Acts. This encompasses the possibility to limit entry for given areas for such vessels.

Costs and Funding Sources of Fisheries Management within the three largest fisheries in India (East)

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Commercial	generic	Yes	Yes	Yes	Yes	No	Yes*
Artisanal	generic	Yes	Yes	Yes	No	No	No

* roughly 0.5% are levied on value for export products

Compliance and Enforcement within the three largest fisheries in India (East)

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Commercial	generic	No	No	Yes	Yes	No	
Artisanal	generic	No	No	No	Yes	No	

Capacity Management within the three largest fisheries in India (East)

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Commercial	Shrimp	Yes		decreasing	No	
	Sardines	Yes		decreasing	No	
	Leiognathids	Yes	India plans to have fleet capacity measured by 2005	decreasing	No	
	Shrimp	Yes		decreasing	No	
Artisanal	Sardines	Yes		decreasing	No	
	Leiognathids	Yes		decreasing	No	

n.a. = not available

Country review: Indonesia

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September, 2004

I. INTRODUCTION

Indonesia¹ is the fourth largest country in the world with a land mass of 1.9 million km², archipelagic territorial sea of some 3 million km², and an EEZ extending to approximately 3.1 million km² around the estimated 19,000 islands and its 81,000 km of coastline. Indonesia, with its 27 provinces², spreads over a large area (4800 km on the base) with the South China Sea and Celebes Sea to the north, the Pacific Ocean to the northeast, the Arafura Sea to the east, and the Indian Ocean to the south and west with the Malacca Strait forming the bridge between the South China Sea and the Indian Ocean. The coastal areas are rich in seagrasses, coral reefs and mangroves.

There are two basic seasons in Indonesia, the dry season, May to October and the wet season, December to March with the transition seasons providing shifting winds and very changeable weather. Temperatures range around 25 to 33 degrees centigrade, with cooler temperatures in the mountains.

Population and the economy

The marine resources provide food to the 60 percent of the total 211.7³ million population that live in the coastal areas. Approximately 63 million (50 percent of the total on the coast) of these coastal residents are fishers (ADB Coastal Project 1999). The value of the fishery, including mariculture, is steadily growing and was approximately US\$4.2 billion (2.4 percent GDP) (Willoughby *et al.*, 1996). It is estimated that 21 percent of the national GDP of (US\$172.9 billion⁴) comes from the agricultural, coastal and marine resources.

POLICY FRAMEWORK

The fisheries sector policy statement in the National Development Plan (REPELITA VII for 2000-2005 supported by ADB) includes efficient and sustainable management of maritime resources and the rehabilitation of damaged coastal and marine ecosystems, through improved spatial planning.

Fisheries policies are set out through the new Ministry of Marine Affairs and Fisheries (MMAF established in 2000) through the legislative instruments that are used by the Government. These are discussed further under the next section, but in essence include national, presidential, ministerial, provincial, and district legal tools. For marine capture fisheries, the Directorate General for Capture Fisheries of the

¹ Note: The information for this paper was gathered from many multi-media sources, the internet, and papers, some published and some being "grey literature", but a key source was a 53 page FAO Questionnaire sent to fisheries contacts in each country to assist them in formatting their responses. Data provided in these questionnaires comes from officials and Department's files, and shall be reported in this paper as "personal correspondence and discussions with Department officials".

² The country has some 300 districts, 3000 sub-districts and 60,000 villages (Directorate General of Fisheries 1997)

³ World Bank Web Pages 2003. *Indonesia at a Glance*.

⁴ Ibid.

Ministry has the mandate to develop and issue policies for these fisheries and these are then implemented through the provinces and districts according to their respective authorities under the Autonomy Law No. 22/99⁵. Informal local policies in some areas come from traditional, unwritten laws handed down from generation to generation. These are referred to as “traditional law” or locally as *sasi* or *adat law*. Traditional conservation policies are thereby passed on to future generations.

It is to be noted that the Indonesian Institute of Science and Technology (LIPI) and Central Fisheries Research Institute (CRIFI) and three other Research Institutes (Research Institute for Marine Fisheries, Research Institute for Freshwater Fisheries and Research Institute for Coastal Aquaculture) are the official agencies that provide research assistance to the Ministry. Further, the universities often become involved in fisheries research to assist the Ministry of Fisheries in the development of capture fisheries management policies and strategies.

One of the first legislative instruments that addressed fisheries was the Ordinance on Territorial Waters and Maritime Zones, 1939 defining the zones and designating the Navy Commander as the authority for limiting or prohibiting fishing. This ordinance has evolved into a myriad of acts and regulations and other legal mechanisms that together define and provide the legal backing for the fisheries management policies at the various authority levels including those at the national, provincial and district levels.

The current national core fisheries law is the Fisheries Act No. 9 of 1985. The key objectives for fisheries management as contained in the Fisheries Act of 1985 include:

- sustainability of the marine resources
- introduction of appropriate technical, economic and biological management measures
- enhanced socio-economic benefits
- supply of fish protein and food security
- foreign exchange earnings
- employment opportunities

This Act is now under review for several reasons:

- to update it to address international principles, mandates, norms and obligations of UNCLOS 1982, the UN Fish Stocks Agreement, the FAO Compliance Agreement, and the Code of Conduct for Responsible Fisheries;
- to include the requirements of the new regional Western and Central Pacific Ocean Fisheries Convention to which Indonesia is a signatory;
- to address the mandate and management needs of the new Ministry of Marine Affairs and Fisheries;
- to rationalise the devolution of authority for fisheries management under the Autonomy Law No. 22/99;
- to address conservation and management issues and measures evolving from various fisheries development initiatives in the country, e.g. coral reef rehabilitation and management project (World Bank, Asian Development Bank, Australian Aid), coastal community management project (ADB), Coastal Resources Management Project (USAID), and others.

There is a current initiative for a Coastal and Small Islands Act under the Ministry to address fisheries management issues in the coastal areas that will also provide general consistent guidance to District Governments in the management of their coastal waters.

⁵ For the purposes of this paper, “national” means the entire country; “regional” equates normally to provinces (27 in number) and “local” equates to the Districts.

There are several agencies whose mandates interact and overlap with fisheries, consequently the legislation of these agencies either directly or indirectly impacts on fisheries policies, laws, and management practices. Some of these agencies include:

- Ministry of Local and Interior Government – for devolution of management authority to both the provinces (0-12 nm) and districts (0-4 nm);
- Ministry of Forestry – that has taken management authority for all marine parks;
- Ministry of Environment for maritime environment issues;
- Navy, Maritime Police for their maritime enforcement roles.

Compliance with fisheries laws is executed through the local provincial and district fisheries administrations, and the navy and maritime police agencies. Communities are being urged through several coastal resource development programmes to assume greater input into the management planning, policy development, and the implementation process, although this is still in its infancy. This latter task is often being undertaken through non-government organizations (NGOs).

LEGAL FRAMEWORK

Fisheries Management is defined in the legislation as the “*management of all activities that are directed towards fisheries natural resources to ensure utilization in an optimal and sustainable manner*”.

Fisheries management falls under the joint responsibility of the Ministry of Marine Affairs and Fisheries and the provincial and district governments. The devolution of authority for government management, including fisheries, to the provinces (0-12 nm) and district levels (0-4 nm) under Autonomy Law No. 22 is presenting new challenges for the implementation of fisheries management regimes. The establishment of the Ministry of Marine Affairs and Fisheries to coordinate this devolution exercise and provide a guide for consistent implementation according to fisheries legislation is a very positive step for fisheries management in Indonesia.

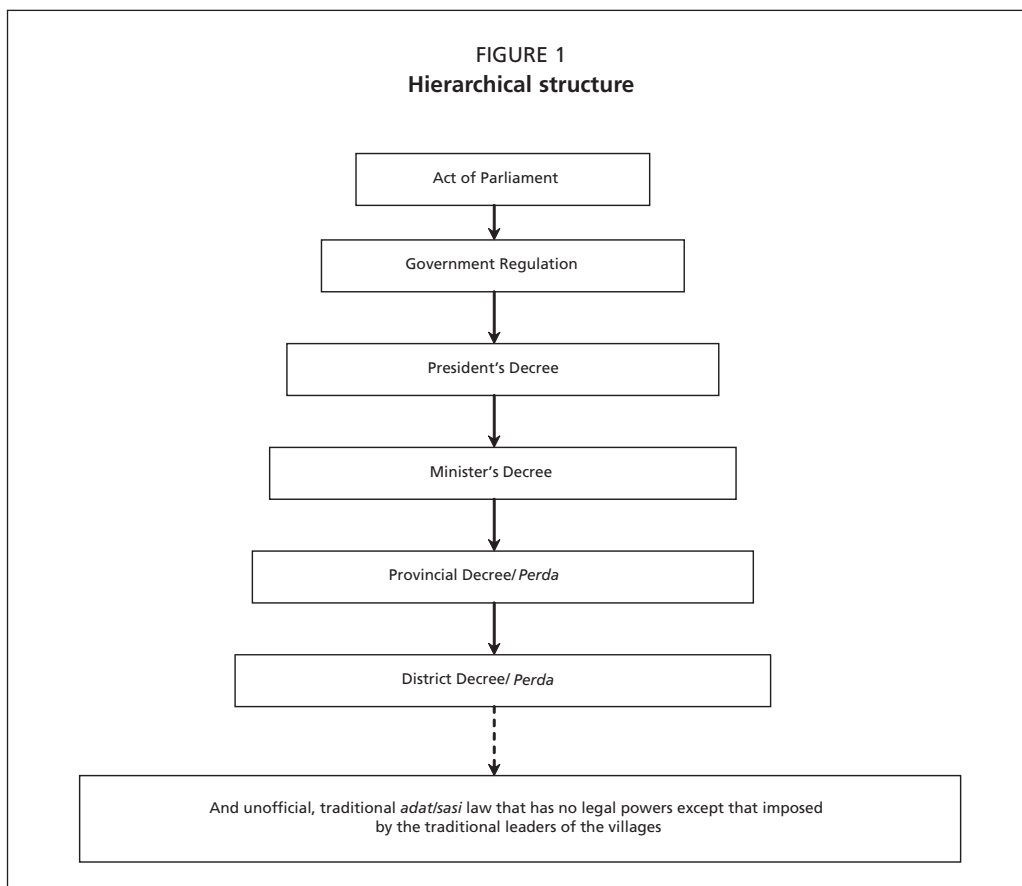
The management planning functions rest with the Directorate General for Capture Fisheries; legal and regulatory development with the Secretary General; and research with earlier noted Research Directorate. The MCS functions rest with the Directorate General for Marine Affairs Resource Controlling and Fisheries Surveillance, supplemented by assistance from the armed forces (mainly the Navy and Air Force), and the Marine Police⁶.

Fisheries legislation follows a strict hierarchical structure of priority and authority levels including those shown in Figure 1.

As noted earlier, the key fisheries legislation is the Fisheries Act No. 9 of 1985, supported directly by Government Regulations No. 15/1990 and No. 15/1994. The above system has been in place for several years and as an example, there have been one Presidential Decree, one Presidential Instruction (treated as a decree), and 24 Ministerial Decrees for fisheries since 1973 to establish various business and resource management controls. Unfortunately, implementation of these legislative instruments has generally been weak. The exception has been recent efforts (2001 to date) by the Navy against foreign fishers where they have found that financial benefits from penalties are greatest.

Indonesia has implemented a scheme of joint management and implementation authority levels in accordance with the aforementioned Autonomy Law whereby the:

⁶ The structure of the new Ministry has been evolving over the past few years and MCS is now under its own Directorate while the Directorate for Capture Fisheries (formerly the entire Fisheries Department under the Ministry of Agriculture) is still under change while its former responsibilities are being revised and re-distributed leaving this Directorate with the mandate, at the time of writing, for fisheries planning, licensing and aquaculture.



- Districts manage through District Decrees (called Perdas) for the area 0-4 nm from their coasts;
- Provinces from 0-12 (the overlap being for coordination and consistency between districts at the provincial level); and
- the National government and agencies take responsibility for fisheries management and implementation outside the 12 nm zone.

Licensing of fishing vessels and reporting requirements are based on vessel size with vessels smaller than 5GT being considered artisanal and not required to report, but they must be registered at the district/provincial level. Where registration of artisanal vessel is actually carried out, it is done annually and with an automatic renewal system if there are no reported changes to the vessel, such changes seldom being reported, and the registration process being poorly maintained. Larger vessels are normally first licensed at the national office. Annual renewal licenses (depending on size) are then automatically issued at the provincial offices if there are no changes to the vessel or its equipment. All vessels over 5GT are required to be inspected for safety by the Ministry of Sea Communications and Transport prior to being licensed for fishing by the Ministry. One consequence of this safety registration is that many fishers believe this safety registration is their fisheries license and do not seek the latter from MMAF. Compliance with these requirements is still a challenge for the Ministry. Licensing has not been fully implemented as a management tool for fisheries.

Fisheries management is influenced by the autonomy law, and also, perhaps more intrusively by the Ministerial Decree from the Minister of Forestry (not fully devolved under the Autonomy Law) whereby that ministry assumes management control and authority for all marine parks. This overlap in spatial and sectoral responsibilities remains a challenge for the ministries today and is further complicated by the District authority under the Autonomy Legislation.

BOX 1

Autonomy Laws 22 & 25 of 1999 and their impact on fisheries management

The change in administrative regimes from President Suharto, President B. Josef Habibie (22 May 1998) to President Abdurrahman Wahid (Oct 1999), and then to President Megawati Sukarno-Putri (23 July 2001) in the 1998-2001 period was accompanied by considerable civil unrest and demands for greater autonomy and equitable revenue sharing from regions and provinces. This grew over the late years of President Suharto and in an attempt to placate the regional Indonesian populace, he sought assistance to devolve some of the authority of the central government to the provinces and districts. With legal support from the GTZ, the devolution exercise continued through to his successor, President Habibie and on to President Wahid when the Autonomy Laws #22 (authorities) and #25 (cost sharing) were enacted, in July 1999, and to come into effect January 2001. These laws established zones of responsibility for fisheries and the marine sector for the districts (0-4 mm), provinces (0-12 mm) and the national government (outside 12 mm). At the same time, a higher priority was given for exploitation of the marine resources. The Directorate General of Fisheries was moved out of the Ministry of Agriculture, to become a new Ministry of Marine Affairs and Fisheries (MMAF) in 2000, with the usual internal challenges for authority, that arise from such actions. The National Maritime Council was re-established; further challenges arose as the MMAF struggled with both its new organization and the devolution of national authority to the Provincial and District Leaders to become effective in January 2001. Devolution was still being resisted by centralists in Jakarta who did not wish to return to the regions.

For Presidents Suharto, Habibie and Wahid it was too little – too late, but for President Sukarno-Putri and the current and future Ministers of MMAF, the Autonomy Laws were and remain a reality.

Many believe the Autonomy Laws did not go far enough, but the Governors and District Heads are flexing their new autonomy muscles to exert their authority. The challenge for MMAF will be the change from a central, Jakarta-based directional authority, to one of coordination and facilitation of Provincial and District initiatives within the principles of sustainability and responsible fisheries.

Tourism, Port and Transport Departments under the Ministry of Sea Communications and Transport often have significant impacts on fisheries due to the spatial overlap in the coastal areas whereby, construction or other activities can clearly negatively impact fisheries health of habitat. The liaison between the Ministry of Marine Affairs and Fisheries (MMAF) and other agencies, as noted above, is facilitated through the National Maritime Council chaired by the Minister of MMAF. The effectiveness of this inter-agency arrangement has yet to be assessed, especially with the added complexities introduced by the Autonomy Law, and devolution of authority, consequently new initiatives in fisheries or coastal areas can expect to be required to clear several hurdles before approval.

Further, indirectly-related legislation that impacts on marine capture fisheries includes:

- endangered species legislation
- export/import/trade legislation
- biodiversity legislation
- oceans policy legislation
- marine park/sanctuary/reserves legislation
- port management legislation
- coastal management legislation

BOX 2

Non-government organizations and community groups in Indonesia

The introduction of NGOs, and community groups has been an evolving effort for several years and encountered several of the traditional stumbling blocks of many other countries:

1. Proliferation of NGO's, many with political ties, as instruments to seek donor funding, this complicating the search for "credible" NGO's with resulting in political outbursts of "favouritism" during tender processes.
2. The idea that "big", or "international" is better sometimes ignores local, commitment and efforts resulting in "template" solutions that do not meet local needs.
3. Donor driven NGO selection favouring international NGO's as opposed to local dedicated groups.
4. Direct assistance to community groups or NGO's while ignoring the political infrastructure thereby creating two problems:
 - a. concern at local government level groups re: authority and participatory action; and
 - b. assumption of a confrontational attitude by NGO's and community groups who perceive they have greater powers due to donor assistance and central government selection.
5. In fighting between NGO's/community groups, or NGO's and local government thus reducing effectiveness as a "bridge" between government and stakeholders, and the resultant preference by local government to manage without NGOs, said assistance preferred to go to local government institutional strengthening – instead of NGO/community groups that remain outside of government.

Devolution of authority can also result in a wider testing of authority by local officials. This can create tensions between local government NGO, community advocacy groups, universities and educational groups or institutions that perceive this as their role.

These have been traditional teething problems with the introduction of NGO or use of community groups in many countries, e.g., Philippines. However, in Indonesia, as credible NGO's go through the learning curve and recognize their "bridging role" as opposed to confrontational role – the benefits of their presence is being recognized by progressive provincial and district leaders as a supportive mechanism for management.

Specific examples include:

- export/import/trade legislation
Napoleon, trochus, and others (induk kerapu, induk udang, kima, mimi mintuno, Coelachant, penyu)
- port management legislation
Minister of Agriculture Decree No 1082/1999 on fishing port management,
Minister of MMAF Decree No. 26.I/2001 on organization structures for fishing ports
- coastal management legislation
Minister of MMAF Decree No. 41/2000 on guidelines for small island management

In summary, Indonesia has a comprehensive legal framework for fisheries management that is somewhat complicated by multiple authority levels of legislation and the overlapping intra- and inter-agency jurisdictions. This framework is further complicated by the devolution of fisheries management authority to the provinces and districts, and the growing transparency and consultative, participatory approach being trailed by the national fisheries authorities.

The increasing introduction of non-government organizations and community groups to assist in bridging and providing input to management planning and implementation is a challenge for all government levels, but, despite usual introductory concerns, it is becoming accepted as the future management practice, and is supported by an appropriate legislative structure.

STATUS OF FISHERIES

The potential yield of marine fish resources of Indonesia has been estimated in 1997 to be 6.2 million tonnes/year. With Indonesia's rapidly growing population and increased demand for fish for home consumption, currently at 20 kg/capita/year, its sustainable production capacity is already stressed. The total 1997 multi-fishery/gear fisheries marine capture landings in Indonesia was 3.6 million tonnes with an estimated value of US\$4.2 billion. This equates to a contribution of some 2.4 percent to the national GDP, and 13 percent of the agricultural component. Further, fish exports in 1998 were US\$1.6 billion compared to imports of US\$49 million.

The former Directorate General of Fisheries in the Ministry of Agriculture grouped the fishing grounds into four key areas: (1) Eastern Indian Ocean; (2) Sunda Shelf; (3) Sulawesi; and (4) Maluku-Irian Jaya.

The **Eastern Indian Ocean** is divided into three sub-areas: (1) West Sumatra, covering the provinces of Aceh in North Sumatra; West Sumatra; Bengkulu; and Lampung; (2) South Java, covering the provinces of West and Central Java, Yogyakarta and East Java; and (3) Bali-Nusa Tenggara, covering the provinces of Bali, west Nusa Tenggara, east of Nusa Tenggara and East Timor. These areas have, in general, a narrow continental shelf with deep water; and fishing activities are mainly on large and small pelagic fish.

The **Sunda Shelf** area is divided into the Malacca Straits, the southern part of the South China Sea and the Java Sea. In these generally shallow waters, the fishery resources are mainly demersal and small pelagic fish. The stocks in the Malacca Straits are shared by Indonesia, Malaysia and Thailand.

The waters around Sulawesi are generally deep with high salinity. The fisheries in these waters target large and small pelagic fish.

The waters in **Maluku-Irian Jaya** comprise both shallow and deep waters. The Arafura Sea is relatively shallow; and as such, it contains large fishing grounds for both demersal and small pelagic fish. Tuna and skipjack can be found over the whole area of deeper waters adjacent to the western central Pacific Ocean.⁷

Some 94.6 percent⁸ of the total marine fish landings are taken by small coastal fishers using lines, traps, beach seines or lift nets, with pole and lines, trolling gear and mini-seines for tunas and small pelagics with 2/3rds coming from the western area. The industrial fishery targets the high value shrimp and tuna fisheries; hence contributes more significantly to the value of landings than the small scale coastal fisheries (Table 1).

In 1996 the estimate of total fishers was 4.7 million with 2.5 million⁹ in the capture fishery and 2.2 in the aquaculture activities. This has been increasing yearly and the Government indicates that as of the latest figures in 2002, there were approximately 4.1 million capture fishers in Indonesia, 1.17 million in the commercial fisheries and the artisanal fishery taking the remainder. As in many countries the question, is raised as to whether artisanal fishers are for subsistence fishing only. In Indonesia, artisanal fishers

⁷ Menasveta, D. 1997. *Fisheries Management Frameworks of the Countries bordering the South China Sea*. Asia-Pacific Fishery Commission, FAO, Bangkok, Thailand 1997.

⁸ FAO Indonesia Information on Fisheries Management web page.

⁹ The large concentrations of fishers are in north Java (22.8 percent), east Sumatra (12.3 percent), Southeast Sulawesi (9.47 percent) and North Sulawesi (8.91 percent), *Ibid*.

TABLE 1
Characteristics of the major fisheries of Indonesia

Fishery	Vessels 2002 ¹	Fishers 2002	Catch & value 2002 (US\$ 2002 equiv)	Catch & value five yrs ago	Catch & value ten yrs ago
COMMERCIAL					
Longline	1,497	949,980	197,344 mt/ \$606,387,810	154,330 mt/ n.a.	110,035 mt/ n.a.
Purse Seiners	916	210,840	609,243 mt/ \$1,872,048,440	586,241 mt/ n.a.	395,857 mt/ n.a.
BED equipped Shrimp Nets	402	5,944	103,468 mt/ \$989,610,560	95,536 mt/ n.a.	18,249 mt/ n.a.
Sub-Total	2,815	1,166,764	910,055 mt/ \$3,468,046,810	836,107 mt/ n.a.	524,141 mt/ n.a.
ARTISANAL²					
Gillnet	(339) ³	2,443,155	829,376 mt/ \$4,324,138.79	708,428 mt/ n.a.	539,190 mt/ n.a.
Seine Nets	(30)	338,248	633,751 mt/ \$3,304,203.74	369,686 mt/ n.a.	306,665 mt/ n.a.
Traps	(48)	129,982	226,852 mt/ \$2,025,729	235,305 mt/ n.a.	192,781 mt/ n.a.
Sub-Total	(417)	2,911,385	1,689,979 mt/ 9,654,071.53	1,313,419 mt/ n.a.	1,038,636 mt/ n.a.
TOTAL	(3,232) 402,104 (1997)⁴	4,078,149	2,600,034 mt/ \$3,477,700,881	2,149,526 mt/ n.a.	1,562,777 mt/ n.a.

* It has been estimated that approximately 937 foreign fishing vessels are in joint ventures with Indonesia, and fishing in Indonesian waters (Menasveta 1997).

¹ The only statistics available are for those vessels licensed at the central fisheries HQ and do not include any that may be licensed by provincial offices.

² Artisanal fishers and fishing are classified in the Fisheries Law as those using vessels less than 5GT, or no vessel at all.

³ Written communications from MMAF Sept 2003.

⁴ FAO Web page, noting that this includes all artisanal fisheries, with 56.9% of the boats non-powered; 70.6% less than 5 GT and another 21.95% between 5-20 GT all making daily fishing trips.

vary from subsistence fishers in the isolated rural areas, to “small scale” commercial fishers bartering or selling their excess catch, to contracted fishers for the live reef fish trade, and also include full commercial fishers who bribe their way into the “artisanal” fishery category (<5GT) to avoid taxes, reports and restrictions. Ineffective licensing and law enforcement permits this to occur.

Fishers are categorised into full time (51 percent) and part time (49 percent). The high populations in Western Indonesia create a large demand for shallow water, reef and small pelagic fishes, while the eastern areas with the deeper waters are more suitable for the large pelagics. The South China Sea with its proliferation of charter vessels is assumed to be at, or nearing the MSY for small pelagics, however the western waters may have room for continued exploitation. The waters of the Arafura Sea and other deeper eastern waters appear to have room for expansion in the small and large pelagic, shrimp and squid fisheries.

MANAGEMENT ACTIVITY

The general fisheries development objective for Indonesia is the promotion of sustainable development in the fisheries sector through responsible fisheries with the management aim to find a balance between production, distribution and conservation of the resources and their environment. More specifically, efforts within the Ministry are targeted to:

- appropriate biologically sensitive and economically viable levels of fishing;
- preventing conflict between users;
- utilizing fish better - more socially desirable distribution of economic rent;
- conserving the resource;
- preventing overexploitation by controlling effort;

- improving quality of fish by reducing post-harvest losses;
- developing the use of new fish resources, including fish farming, and aquaculture,
- use of little-known species; and
- improving marketing and presentation of the products.

Biologically, the management of the fisheries resources is based on fish quotas, i.e., the total allowable catch (TAC) of 4.96 million tonne/year, that is determined on the basis of up to 80 percent of the total estimated potential yield (6.2 million tonne/year). Currently the fisheries resources are classified into several groups, namely: (1) large pelagics (skipjack, tunas, billfish, oceanic sharks and small tuna); (2) small pelagics (including scads, mackerels, sardinellas, trevallies, engraulid anchovy, etc.); (3) demersal and coral reef fishes (groupers, snappers, rabbitfish, slipmouth, etc.); and (4) prawn, shrimp, and other crustaceans.

The management of the fisheries resources falls to the Ministry of Marine Affairs and Fisheries (MMAF) and through the Autonomy Law to the Provincial Governors for 0-12nm, and the District Heads (*Bupati*) for 0-4 nm. Fisheries law can be developed and implemented at all these levels, but it must comply in intent with the national fisheries laws and Ministerial Decrees. The Government responded to a recent FAO Questionnaire that the management process was very transparent and stakeholders were active participators into the management planning and implementation, but stakeholders have not been given full management authority for the fisheries at this time. Fishers in the commercial fisheries have formed into associations, e.g. Tuna Association.

In recent years, both the commercial and coastal fisheries management authorities have commenced consultation with stakeholders for fisheries management planning, and are working with NGOs to assist in the implementation of this process. This is becoming the norm, providing opportunities for fishers input into the process. Initial plans and strategies are still developed centrally until the devolved authorities are prepared to assume the lead in this process. The Ministry does work closely with the provincial parties, and through several coastal fisheries initiatives, with the Bupati to prepare them to assume these duties. The devolution of authority necessitates a high degree of transparency in the process to recognise the role and authority of all participants. Community and stakeholder involvement at fisheries management meetings is increasing, especially with the use of media services to announce meetings and distribute materials.

BOX 3

NGOs and community groups in Indonesia

Successful and sustainable involvement of stakeholders as a management tool in Indonesia has been dependent upon two factors:

- continuation of donor funding; and
- support for a “champion” for sustainable resource management, either foreigner or local, who takes the course to the community and community/local government leaders.

The risk however, is similar to that for donor funding - the commitments often exists only as long as funding and/or the “champion” remains. If either factor is removed from the initiative it often fails, e.g., WB COREMAP RIAU; USAID CRMP in Buton.

Commercial Fisheries: Approximately 1/3 – 2/3rd of the fisheries are managed from the national level, and less than 33 percent are managed at the provincial and local levels,

BOX 4

Effectiveness of penalties

Enforcement includes the graduated fiscal penalties, suspension or cancellation of licenses, refusal for new licenses and full removal from the fishery as penalty options, but unfortunately the infractions appear to have been increasing over the past ten years despite the introduction of VMS, observers, dockside and landing site and at-sea inspections. *This indicates the fact that the penalty scheme is not an effective deterrent, the education efforts to promote voluntary compliance are not effective, or that law enforcement monitoring efforts are increasing. Alternately, it could indicate that fishers have no respect for the laws and prosecutorial system, possibly due to the low deterrence measures in place, e.g., penalties are just a cost of doing business and do not significantly detract from illegal gains, e.g., the gains from illegal fishing exceed the penalties such as the ability to retain illegally caught fish and sell it for US\$50,000, while the maximum fine is only equivalent to US\$3,000.*

although the number of fisheries coming under co-management has been increasing over the past ten years. At this time the three major commercial fisheries: longline for tunas (set lines and drift lines); purse seine fisheries; and by-catch exclusion device (BED) equipped shrimp nets¹⁰ do not have formal management plans, but are regulated through legislation. The use of legislation for management, recognizing the multi-species fisheries, is more prominent (33-67 percent) in Indonesia than the use of formal management plans (less than 33 percent) with licensing and limited access, area designations, TACs, taxes, and gear (gear type, hook size, mesh size, engines and vessel sizes) restrictions being the most common for the larger commercial fisheries. Measures to address ecosystem concerns include the prohibitions regarding: setting of fish aggregating devices (FADs) during fish migration periods; and the use of poisons for fishing. Further is the requirement for the use of turtle (TEDs) or by-catch exclusion devices (BEDs) in shrimp trawls, although the enforcement of these conservation measures is weak. Education, limited area access by gear type, stock enhancement and resource allocation are also reported by MMAF as management tools used in the commercial fisheries of Indonesia.

There is reported overfishing and overcapacity in the longline and shrimp fisheries, however, aside from imposing licensing fees, reduction in capacity has not been realised.

Conflicts in the commercial fisheries are resolved through specific consultation between parties and if not resolved, through legal steps.

Artisanal/Coastal Fisheries: The three major multi-species, artisanal fisheries in terms of capacity and value are:

TABLE 2
Major artisanal fisheries in Indonesia

Fishery	Fishers (estimated) ¹	Area of fishery
gillnet fishery	2.4 million	in all coastal fisheries in Western Indonesia
seine net	338,000	Malacca Strait, Java Sea and North Sulawesi
trap fishery	130,000	coastal waters of East Sumatera and South Sulawesi

¹ Source: Personal communications with MMAF officials Oct/03.

¹⁰ Longlines fishing predominantly in Banda Sea, Indian Ocean, Sulawesi Sea, and Pacific Ocean; purse seines in Java Sea, Malacca Strait, South China Sea, Sulawesi Sea and Flores Sea; and Shrimp nets in Arafura Sea (West Papua), Malacca Strait, East coast Kalimantan.

Management objectives are twofold, to ensure resource sustainability, and to minimise conflict. Management tools in use include licensing, gear type restrictions, limited entry, the establishment and monitoring of TACs and fish catches, and taxes on fisheries. Further, in some of the coastal fisheries recognition of traditional rules and customs are used for conservation management. Increased consultation has resulted in less conflicts between stakeholders, and efforts to merge government and stakeholder expectations, but it has not resulted in stabilisation of stocks, facilitated management decision-making nor has it provided an incentive for greater voluntary compliance and stewardship of the resources. Conflict is greater in the gill and seine net fisheries focused more on different type vessels and intrusion of fishers in other fisheries. As in the commercial fisheries the conflict resolution process includes the use of management tools to reduce these incidents including: education, stock enhancement, allocation amongst users, zoning and area restrictions with specific steps for resolution up to and including court action.

Licensing and registration mechanisms are weak and lack enforcement; data collection verification and analysis for planning is very weak; and enforcement of current laws by law enforcement agencies with appropriate penalties being handed down to violators is almost negligible for the national fleets. Lack of attention to these three key inputs to sustainable and responsible fisheries management significantly increase the challenge for the Ministry to meet its mandate, while reducing its probability for success.

In summary, the fisheries management processes rely on the legal instruments to manage the fisheries as opposed to formal management planning schemes. They include stakeholder participation, and now include devolution of management authority to the provinces and districts with greater consultation for management planning, implementation and conflict resolution. Unfortunately these measures have not yet shown an appreciable positive impact on stock recovery, stock stability, or the realisation of sustainable management in either the commercial or coastal/artisanal fisheries. The apparent lack of commitment to data collection and verifiability of such data and enforcement of the laws continues to have a negative impact on stock recovery, and hence enhanced fishers returns.

Indonesia's recent efforts at the National level to control IUU fishing are becoming effective, but its legislation needs urgent review as non-sustainable measures have been included in past legislation to benefit foreign investors and local partners, e.g. redefinition of trawl nets to fish nets to allow their use in western Indonesia, etc. Inter-agency coordination through the National Maritime Council (DMP) has proven as ineffective as its two predecessors over the past ten years, due to lack of inter-agency cooperation, and this is expected to continue. Coastal co-management is becoming popular and growing in acceptance in donor project areas, but lack of local capacity hinder its widespread acceptance. This is further exacerbated by the continuation of centralist resistance to devolution in some agencies.

The new Ministry has potential to address the fisheries management situation in Indonesia in a responsible and sustainable manner, but it will require strong and committed leadership to change the attitudes of "laissez-faire" of the past decades, and acceptance of the principles of devolution of authority to coastal areas, consequently progress cannot be expected to be rapid. It is noted however, that key inroads and "champions" are coming to the fore to take on these challenges in both the offshore and coastal management areas.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

All levels of government contribute to the cost of management with a portion of these costs assessed to fishers for their participation in the industry. Resource rents and

other mechanisms are not yet being used in Indonesia. The increased involvement of stakeholders, increased monitoring and data collection, enforcement, conflict resolution requirements and modifications in management strategies have increased the cost of management of the fisheries. Although this is currently borne by the Government, officials state that they are investigating mechanisms to increase contributions from stakeholders and participants, e.g., selling user rights to coastal areas, increased licensing fees; higher penalties, etc., but these are yet to be implemented.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Indonesia ratified UNCLOS 1982 on 3 February 1986 and the Agreement relating to the implementation of Part XI of the Convention on 2 June 2000. The UN Fish Stocks Agreement and the FAO Compliance Agreement have not yet been ratified.

Indonesia has taken several actions with respect to international mandates and initiatives including:

- familiarisation/socialisation training on the Code of Conduct for Responsible Fisheries (CCRF);
- preparations for a National Plan of Action for IUU Fishing to be implemented in 2004;
- preparations of a national strategy for the implementation of the CCRF;
- preparations for the establishment of a management authority for endangered species;
- preparations for implementation in 2004 of the NPOA for reducing catches of seabirds in longline fisheries;
- preparations in 2004 for the NPOA for conservation and management of sharks;
- final arrangements on the 2003 NPOA for management of fishing capacity to be introduced to fishers in 2004 prior to implementation.

Indonesia is now measuring the capacity of its capture fisheries, said exercise to be completed prior to 2005 as urged in the IPOA. Further, Indonesia is introducing VMS, MCS, and strengthening its licensing, law enforcement and inter-agency enforcement capacity to address IUU fishing.

Increased statistical capacity is being introduced for tuna with assistance from Japan in preparation for WCPFC, but lack of budgets is hampering other data improvement initiatives.

PARTICIPATION IN REGIONAL FISHERY BODIES

Indonesia actively participates in the following regional fisheries related bodies:

Conventions to which Indonesia is a party

IOMAC	Indian Ocean Marine Affairs Cooperation
SEAFDEC	South East Asian Fisheries Development Centre

Member of Regional Organizations

BIMP-EAGA	Brunei, Indonesia, Malaysia, Philippines – East Asia Growth Area
SEAFDEC	South East Asian Fisheries Development Centre
NACA	Network of Aquaculture Centres in Asia-Pacific

Participant but not a Member

CCSBT	Commission for the Conservation of Southern Bluefin Tuna
IOTC	Indian Ocean Tuna Commission
WCPFC	Western and Central Pacific Ocean Fisheries Commission
BOBP LME	Bay of Bengal Program – Large Marine Ecosystem Project
IMT-GT	Indonesia/Malaysia/Thailand - Growth Triangle
IMS-GT	Indonesia/Malaysia/Singapore - Growth Triangle

AIDA Inter-American Association for Environmental Defense
ICCAT International Commission for the Conservation of Atlantic Tunas

SUMMARY AND CONCLUSIONS

Indonesia, an archipelagic state of some 19,000 islands, straddles the equator across 4,800 km forming the stepping stone island bridge between the South Pacific Ocean and the Indian Ocean. With its population of 212 million persons in 27 provinces, the greater number being in the western provinces, Indonesia has recently devolved its marine management authority (1999) to the provinces (0-12 nm) and the districts (0-4 nm) with the central government and the new Ministry of Marine Affairs and Fisheries taking responsibility for the offshore fisheries outside 12 nm. The devolution of authority is ongoing and requiring amendments to the myriad of complex legislative instruments utilized in Indonesia from the Fisheries Law and National Government Regulations to the various political authority levels for more local regulations called decrees (Presidential, Ministerial, Provincial and District decrees). The Ministry is currently reviewing its key legislation and writing a new Coastal and Small Islands (fisheries resources management) Act for the country to assist the new devolved management authorities. Indonesia has a comprehensive fisheries legislative system support its new fisheries management system. This new system is more transparent, consultative and participatory with input sought from stakeholders and efforts to establish a collaborative management regime between government and stakeholders, including the fishers down to the village levels through assistance from many donor initiatives.

The 3.6 million mt marine capture fishery, involving some 4.1 full and part time capture fishers (1.2 million being in the commercial fisheries), has an estimated total value of US\$4.2 billion. Commercial fishers target the high value tunas and shrimp while the artisanal fishers target the small pelagics and reef fish, the latter group harvesting approximately 94 percent of the total volume of the fisheries most coming from the western shelf areas and the Arafura Sea area. The fisheries are harvested from an estimated half million fishing boats, 150,000 being for the open water and some 3 180 (Menasveta 1996) being used in the larger scale commercial fisheries, with the remainder for coastal areas. It has been estimated (Menasveta 1997) that approximately 937 foreign fishing vessels operate in Indonesian waters under joint venture agreements.

MMAF officials¹¹ state that they are now utilizing several management tools to address conservation including: limited entry licensing, zoning and area, gear restrictions, and even bycatch exclusion devices (BEDs) for the demersal by-catches in shrimp trawls. The requirement for turtle exclusion devices (TEDs) is claimed to be in place for trawls and traps, but the success of such implementation is not known by this writer.

Indonesia is in a state of evolution of its fisheries management and has based its processes on legislative instruments, with attention to more transparency, consultation and input from stakeholders and devolution of authority. Indonesia is actively participating in several regional fisheries related organizations including the new 27 country, Western Central Pacific Ocean Fisheries Commission. Further, Indonesia is actively addressing international and global conservation initiatives for:

- IUU fishing;
- conservation and management of sharks;
- fishing capacity management; and
- reduction of by catch of seabirds in the longline fishery.

¹¹ Written correspondence from MMAF officials, Sept 2003.

The new Ministry for Fisheries is having difficulties in getting organized, but the efforts on the offshore fisheries through the use of the navy are starting to show the results of the FAO MCS training (FAO, multiple). Unfortunately, the National Maritime Council concept is not effective due to lack of inter-agency cooperation, but this is a mechanism that has potential for future efforts, if given the appropriate leadership and mandate to control the maritime waters. The donor projects are making inroads on management planning and implementation in their respective sites, but these efforts have not yet become ensconced in local government processes, due in part to lack of capacity, as well as central resistance to devolution of authority to provinces and districts.

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APPENDIX TABLES

Current management of marine capture fisheries

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	33% - 67%	33%	33% - 67%	Increasing
Regional	33%	33%	33%	Increasing
Local	33%	33%	33%	Increasing

Summary information for three largest fisheries (by volume) (Year 2002)

Category of Fishery	Fishery	Volume mt tons	Value* mil USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan? (Yes/No)	# of Participants	# of Vessels
Industrial	1 longline	197,344	606,387.81	22%	17%	No	949,980	1,497
	2 purse seine	609,243	1,872,048.44	67%	54%	No	210,840	916
	3 shrimp nets	103,468	989,610.56	11%	29%	No	5,944	402
Artisanal	1 gillnets	829,376	4,324,138.79	49%	45%	No	2,443,155	339
	2 seine nets	633,751	3,304,203.74	38%	34%	No	338,248	30
	3 trap	226,852	2,025,729	13%	21%	No	129,982	48
Recreational	1	Not available						

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

Use of fishery management tools within the three largest fisheries

Category of Fishery	Fishery	Spatial Restrictions	Temporal Restrictions	Gear Restrictions	Size Restrictions	License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
Industrial	1	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
	2	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
	3	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Artisanal	1	No	No	Yes	No	yes	Yes	No	Yes	No
	2	No	No	Yes	No	Yes	Yes	No	Yes	No
	3	No	No	yes	No	Yes	Yes	No	Yes	No

Costs and funding sources of fisheries management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1	Yes	Yes	Yes	Yes	Yes	Yes
	2	Yes	Yes	Yes	Yes	Yes	Yes
	3	Yes	Yes	Yes	Yes	Yes	Yes
Artisanal	1	Yes	Yes	Yes	Yes	No	No
	2	Yes	Yes	Yes	Yes	No	No
	3	Yes	Yes	Yes	Yes	No	No

Compliance and enforcement within the three largest fisheries

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1	Yes	Yes	Yes	Yes	Yes	Yes
	2	Yes	Yes	Yes	Yes	Yes	Yes
	3	Yes	Yes	Yes	Yes	Yes	Yes
Artisanal	1	No	No	No	No	No	No
	2	No	No	No	No	No	No
	3	No	No	No	No	No	No

Capacity management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1	Yes	Yes	Increasing	Yes	
	2	No	Yes	Decreasing	Yes	
	3	Yes	Yes	Increasing	Yes	
Artisanal	1	No	No	No	No	
	2	No	No	No	No	
	3	No	No	No	No	

Country review: Malaysia

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September 2004

INTRODUCTION

Malaysia,¹ formed on September 16, 1963 was a union of the 11 states of Peninsular Malaysia with the self-governing state of Singapore, and the former British colonies of Sabah (North Borneo) and Sarawak. Singapore left the new federation in 1965. Now Malaysia is a federation of 13 states and two federal territories²: (i) Peninsular Malaysia comprised of 11 states and the Federal Territory of Kuala Lumpur, the capital and largest city, occupies some 134 680 km² of the southern half of the Malay Peninsula; and (ii) Sarawak and Sabah occupies the northern third of the island of Borneo, or approximately 202 020 km². The island of Labuan, formerly part of Sabah, was made a Federal Territory in 1984.

More than one half the total land area is covered with tropical forests and with deciduous woodland in the mountains. Meanwhile, the small islands opposite the port of Kota Kinabalu, on Sabah's western coast, have some of the world's most diverse coral reefs and marine life. Malaysia's tropical climate with daily temperatures varying from about 21° to 32° C (70° to 90° F), supports abundant and diverse plant, animal, and marine life. Malaysia's EEZ is some 475 600 km², or 1.5 times as large as its total land mass of 329 758 km².

Population and the economy

The total population of Malaysia is approximately 21.83 million (1999 official estimate) is 54 percent rural, with Peninsular Malaysia being about seven times more densely populated than Sarawak and Sabah. Malays make up 47 percent of the population with Chinese comprising 32 percent and ethnics and Indians the rest. Approximately 65 000 individuals are directly involved in the fisheries as fishers with others in the processing and marketing sectors. The fisheries sector contributes approximately 1.54 percent to the GDP, and is recognized as a major source of animal protein, employment, and foreign exchange earnings.

POLICY FRAMEWORK

"The commitment of the Government of Malaysia to develop the fisheries sector is evident from its increasing funding support to programmes and projects and from the incentives and infrastructure aimed at achieving sustainable development of the sector under the National Fishery Development Plan (Menasveta, 1997)." This statement still holds true today where the Government of Malaysia adheres to the objectives of the National Agricultural Plan of 1992-2010 with respect to the fisheries sector to achieve total fish production of 2.9 million metric tonnes in 2010 with an annual growth rate

¹ Note: The information for this paper was gathered from many multi-media sources, the internet, and papers, some published and some being "grey literature", but a key source was a 53 page FAO Questionnaire sent to fisheries contacts in each country to assist them in formatting their responses. Data provided in these questionnaires comes from officials and Departments' files, and shall be reported in this paper as "personal correspondence and discussions with Department officials".

² These 13 states and federal territories constitute the 15 fisheries statistical areas of Malaysia.

set at 5.5 percent per annum. The challenge of a set growth rate is to ensure that fishing pressures remain within the limits of sustainable exploitation.

There are four key groups of departments that are involved in the fisheries, the *Department of Fisheries* (DoF) responsible for the overall management planning and implementation, including marine parks; the *Ministry of Science, Technology and the Environment* (MOSTE) that provides the scientific foundation for fisheries management; the *Fisheries Development Authority* (FDAM) with responsibility for enhancement of livelihood of fishers, value-added processing and marketing to maximize benefits to the industry; and the law enforcement agencies to supplement coastal and offshore fisheries law enforcement, e.g., *Fisheries Marine Service, Navy, Coast Guard and Marine Police*. These agencies are coordinated in special joint enforcement operations, especially for offshore fisheries through the Maritime Enforcement Coordinating Centre (MECC) chaired in rotation by the Navy and Maritime Police.

The *Department of Fisheries* has policies and strategies³ for the management and development of the national fisheries sector to:

- enforce the Fisheries Act 1985⁴, amended in 1993, and the Exclusive Economic Act 1984;
- manage, conserve, and rehabilitate fisheries resources to ensure their sustainability;
- conduct fisheries research;
- provide training to personnel and fisheries extension services for fishermen, farmers and down stream industry entrepreneurs;
- develop and manage inland fisheries and aquaculture;
- develop and manage marine parks and recreational fisheries;
- control fish diseases and provide quarantine services;
- monitor pollution affecting the fisheries resources;
- provide basic fishery data; and
- establish standards, inspect fisheries products, and control imports and exports of fish products with the co-operation of other related agencies.

These policies and strategies (FAO, 2001) include those focused on:

- direct limitation of fishing effort through the licensing of fishing gear and fishing vessels through the Fisheries Licensing Policy;
- identification of nursery areas that should be protected and managed as a nursing area to ensure survival of juveniles of commercially important fish species through use of closed areas, seasons, establishment of marine park areas (MPAs) and reserves, and zoning by vessel size;
- facilitation of cooperative research effort between government and academic institutions to provide data essential for the formulation of area management plans through transparent management planning involving the stakeholders – fishers and their associations, universities, government at all levels, processors and marketing agents;
- establishment of a strict Monitoring, Control and Surveillance (MCS) scheme to enforce fisheries laws and regulations and address illegal fishing;
- rehabilitation of resources through the establishment of artificial reefs and coral replanting programmes; and
- conservation of endangered species and biodiversity of marine ecosystems.

³ In Malaysia, “National” includes all States; “States” are the next lower division of authority; and then “local” applies to municipal governments. Legislation is however, limited to the national agencies or states and federal territories. Municipal legislation has a very limited focus and is not addressed to marine affairs.

⁴ There was an initiative by FAO in 1999/2000 to further amend the Fisheries Act to incorporate the terms of UNCLOS 1982, UN Fish Stocks Agreement, and the FAO Compliance Agreement where these had not been included in the 1993 amendment. At this time no new amendment has been implemented.

The direct limitation on effort includes a policy for conservation with a moratorium on coastal fishing to limit overexploitation. There are policies to control size and power of fishing vessels with permission for increases only provided by the Director General of Fisheries. Voluntary resettlement to reduce fishing pressures in areas of heavy exploitation has been utilized. Closed areas to protect spawning grounds, nurseries marine parks have also been utilized. Further, the establishment of fishery management zones plays a key role:

- Zone A⁵ Less than 5 nm reserved for non-commercial, owner-operated small scale vessels using traditional gear;
- Zone B Greater than 5 nm for owner-operated vessels less than 40 hp using trawls and purse seines;
- Zone C Greater than 12 nm for commercial fishing using vessels more than 40 gt using trawls and purse seines; and
- Zone C2 Beyond 30 nm for deep sea vessels greater than 70 gt.

Other policies have been established to address:

- i) Conservation of resources, e.g., 40 national marine parks and reserves have been established around islands to preserve nursery areas;
- ii) Rehabilitation of resources using artificial reefs made from tires (66), confiscated fishing vessels (20) and reefs using PVC piping;
- iii) Prohibition of destructive fishing gear and methods, *inter alia* pair and beam trawling, use of electricity, poisons or explosives; and push and gillnets with mesh size greater than ten inch mesh (to minimize catches of large rays, etc.),

These policies, and the strict MCS system have all been ensconced in fisheries laws and regulations.

The *Fisheries Development Authority's* mandate is to upgrade the socio-economic status of the fishermen community, and as such has policies to:

- promote and develop efficient and effective management of fishery enterprises and fish marketing;
- create and provide credit facilities for fish production;
- engage in fishery enterprise through boat construction, and the production and supply of fishing gears and equipment;
- promote, facilitate and undertake economic and social development of the Fishermen's Associations;
- register, control and supervise Fishermen's Associations and Fisheries Co-operatives and to make provisions for matters related thereto; and
- control and co-ordinate the implementation of the aforesaid activities.

In summary, over 60 percent of fishers belong to, and are represented on some 116 fishers associations and organizations at the national, state, area and individual fishers cooperatives levels. Success of the management system relies on policies related mainly to input controls, but output controls can be considered under current legislation. Input controls used include:

- limited access;
- licensing of fishers, vessels and fishing gear with strict terms and conditions for:
 - i) marking of vessels and gear,
 - ii) landing of fish,
 - iii) reporting,
 - iv) processing,
 - v) quality controls, and
 - vi) marketing;
- effort and controls by fishery and gear for conservation purposes;

⁵ Classed as Artisanal fishers – subsistence only.

- fish zonation mechanisms to minimise fisheries conflicts and provide access benefits and rights according to vessel size and gear type; and
- mechanisms for cooperation between planning and law enforcement agencies to encourage voluntary compliance, and enforce fisheries conservation laws and production standards.

Current output controls are limited mainly to conservation measures, *inter alia* harvesting of cockle spat from natural or cultured cockle beds, and the fishing of endangered species, and the establishment of catch limitations.

LEGAL FRAMEWORK

Malaysia has a comprehensive legislative framework for the management of its fisheries, hinging on the Fisheries Act of 1985 and regulations made under that Act. In the early 1990's Malaysia took dramatic steps to gain control of its fishing areas: over fishing; illegal fishing; the lack of timely submission of fisheries data for planning and the enhancement of its fisheries management regime. This effort is noted in the listing of legislation below. There are no international agreements permitting foreign fishing vessels access into Malaysian waters, but joint ventures are approved. The following are key acts, ordinances and regulations applicable to fisheries management include:

Acts

1. Exclusive Economic Zones Act of 1984
2. Fisheries Act of 1985 as amended in 1993

Between 1964 to date, some 20 regulations have been passed under the EEZ Act and Fisheries Act to support fisheries management planning. These address fishing, licensing, gear, seasons, area regulations, species regulations, international obligations for endangered species, establishment of MPAs (40 MPAs in Malaysia), aquaculture and mariculture.

Other legislations⁶ that impact on coastal and offshore fisheries include the:

1. Land Conservation Act 1960 (revised 1989)
2. National Land Code 1965
3. Town and Country Planning Act 1974
4. Street, Drainage, Buildings Act 1974
5. Environmental Quality Act (EQA) 1974
6. Local Government Act 1976
7. Uniform Building By-Laws 1986
8. Environmental Quality (Prescribed Activities) Order 1987
9. Environmental Quality (Prescribed Premises) Order

Fisheries legislation targets three main priorities:

1. optimum exploitation of fisheries resources;
2. protection of the interests of the traditional fishers and improvement their socio-economic status; and
3. sustainable exploitation of the fisheries resources.

The legislation includes a comprehensive description of compliance and enforcement requirements, as well as the authorities, rights, and responsibilities of both officials and fishers in this process for licensing, inspections, reporting requirements, dockside monitoring, use of vessel monitoring systems (VMS), air surveillance, and landing checks, but legislation does not yet include coverage by observers, nor electronic reporting of catches. It should be noted however, that the most effective fisheries

⁶ Menasveta D. from Ch'ng, Kim Looi. 1994. *Coastal zone management plan development in Malaysia with particular reference to the management of fisheries resources* In Proceedings of IPFC Symposium on Socio-economic Issues in Coastal Fisheries Management, 23-26 November 1993, Bangkok, Thailand, pp. 327-247.

licensing system in Asia is that in Malaysia, a system that has been certified as ISO 9000 approved.

The current legislation provides clear disincentives for foreign fishing vessels from entering Malaysian waters. Infractions are sanctioned by a compounded administrative penalty system or court procedures that include: automatic forfeiture of vessels, gear and catches on a finding of guilt, and financial penalties for the master and each of the crew.

Licenses are issued annually, are limited access in nature and strictly enforced. Penalties are severe and implemented with the full support of the Departments of Fisheries and Justice.

In summary, the Department of Fisheries is responsible for fisheries management and its implementation. Legislation for Malaysia however, includes that for the integration of state and federal territories' legislations for fisheries management. Malaysia has an appropriate legal framework to implement fisheries management. This is supported through a strong deterrent mechanism within the laws, as well as a certified ISO 9000 approved, integrated licensing system that is one of the better systems in Asia. The legal framework for fisheries also incorporates international fisheries management principles and plans of action.

STATUS OF THE FISHERIES

The fishery has declined in contribution to the GDP from two percent in the 1980's to 1.5 percent in the late 1990s, due mainly to the rapid industrial development of the country. The Malaysian Government recognizes the fisheries as a key source of protein and also a major contributor to employment and foreign exchange earnings.

The growing shortage of fishermen has resulted in a high dependence on foreign fishers to crew Malaysian vessels above 40 GT, but this is also now occurring on vessels less than 40 GT. The ageing fishing community is one of the challenges facing the government, with 80-90 percent of the crews for the larger vessels coming from Thailand, Philippines and Indonesia. The youth of Malaysia is absorbed into the growing technological and tourism industries than fishing. Maintenance of production levels may therefore require consideration of modernisation of the fishing fleets and industry in the future, including property rights, etc.

Close to one million metric tonnes of commercial catch is taken by some 32 000 fishers using approximately 7 000 vessels. Approximately 34 000 artisanal fishers harvest an additional 200 000 mt using some 21 000 small vessels. Catches are generally landed in the 72 fish landing sites. Noteworthy is the fact that approximately 90 percent of all catches in Malaysia are taken within 12 nm of the coast.

The key fishing gears for the commercial fishery include: the demersal trawl for demersal species; purse seines for small pelagics (mackerels and anchovy); hook and line for pelagics (tunas); and drift and gillnets for higher value pelagics. The commercial fisheries have increased 40 percent in volume from ten years ago and are valued at over US\$0.5 billion, an increase of more than double from the same period. The small artisanal coastal fishery has increased by 25 percent in volume and 120 percent in value from ten years ago. This was due mainly to the increases in both hook and line and drift and gillnet catches.

Only about three percent of the large vessels are greater than 70 gt, 23.2 percent between 15 –70 gt, and 63 percent less than 15 gt. Further, 51.6 percent of the entire fishery uses inboard engines, and 39.3 percent have outboard motors. 63 percent of the entire fleet have engines below 40 hp, 14.8 percent between 40-99 hp and 21.6 percent greater than 100 hp⁷, in essence ... a highly mechanized fleet. The multi-species/multi-gear fisheries in Malaysia incorporate the use of a variety of fishing apparatus, both

⁷ Source - FAO Fisheries Country Profile.

TABLE 1
Fishers and their catches¹

Fishery	Vessels 2002	Fishers 2002	Catch & value 2002 (US\$ 2002 equiv)	Catch & Value five years ago	Catch & value ten years ago
Commercial					
Trawl fishery	6 124	23 567	675 957 mt/ \$190 095 818	601 980 mt/ \$107 740 999	529 544 mt/ \$180 005 876
Purse seiners	899	8 074	255 149 mt/ \$324 761 604	171 512 mt/ \$301 505 454	133 646 mt/ \$62 670 612
Sub-total	7,023	31,641	931 106 mt/ US\$514 857 422	773 492 mt/ US\$409 246 453	663 190 mt/ US\$242 676 488
Artisanal					
Drift & gillnet	16 180	24 494	131 964 mt/ \$124 220 683	144,040 mt/ \$103 539 925	94,191 mt/ \$42 222 497
Hook and line	4 389	6 489	47 533 mt/ \$28 065 208	44 341 mt/ \$19 633 797	37 894 mt/ \$14,217,567
Bag net	504	2 899	22 940 mt/ \$34 989 196	33 015 mt/ \$45 619 552	27,932 mt/ \$24 047 084
Sub-total	21 073	33 882	202 437 my/ \$187 275 087	221 396 mt/ \$168 793 274	160 017 mt/ \$80 487 148
Total	28 096	65 523	1 133 543 mt/ \$702 132 509	994 888 mt/ \$578 039 727	823 207 mt/ \$323 163 636

¹ Statistics provided courtesy of the Department of Fisheries, Malaysia, September 2003.

fixed and mobile gear, but the trawls, drift and gillnets and hook and line for highly commercial fisheries are becoming most popular. The high prices for prawns from the coastal trawl fishery make this the most lucrative fishery, especially on the west coast of Malaysia. Demersal and pelagic finfish (Indo-Pacific mackerel) dominate the trawl fishery, especially on the west coast. The purse seiners target small pelagics and anchovies in the coastal waters, the latter being caught in close inshore waters in West Peninsular Malaysia. The purse seine fishery uses fish aggregating devices (FADs). Drift and gillnets are used for catching small finfish, trammel nets for prawns, and set nets for other demersal species.

The artisanal fishery has three times the number of vessels, the same number of fishers, but only 27 percent of the total value of the fishery in comparison to the commercial fisheries. The artisanal fishery contributes more to local employment than the larger commercial fishery.

MANAGEMENT ACTIVITY

The physical target for fish production for 2010 is 2.9 million mt to meet harvesting targets. The challenge will be to ensure that this merges with responsible management and that it does not negatively impact on sustainability of the resources.

Management measures are in place to maintain all non-traditional fisheries, those fisheries outside 5 nm. The management responsibility lies solely with the Department of Fisheries however, other levels of government are invited to provide inputs. The exercise is usually centralized and top-down, but is well publicized and permits consultation, participation and discussions with fisheries associations, cooperatives, industry, as well as other stakeholders. The consultation process is implemented through the use of the media for announcing policy and then opening the “floor” for discussions with the industry prior to implementation. Management plans are, for the most part, legislated nationally as regulations, or provincially through state law. Fisheries management makes use of up-to-date technology for licensing, and surveillance. This includes vessel monitoring systems (offshore), radar, sea and air patrols, at-sea and port inspections, and cross checking of data integrity.

Malaysia established the capacity to carry out stock assessment through the fisheries scientific network including the Department, other national agencies and institutions.

BOX 1
FAO statistical area 57 and statistical area 71

The general legislation and fisheries management policies for Malaysia are common to all states with Sabah and Sarawak also implementing similar state legislative and management instruments.

Extrapolation of fishing licenses, fishers, and catch and effort from 1997 data to the latest data from the FAO Questionnaire between FAO Statistical Area 57 (west coast of Peninsular Malaysia south to the southern portion of the state of Malacca) and FAO Statistical Area 71 (inclusive of the rest of Malaysia, including Sabah and Sarawak) provides the following:

2002 Vessels & catches				
FAO statistical areas 57 & 71				
Fishery	Vessels Area 57 (predominant States)	Extrapolated 2002 Catch – Area 57 (44%)	Vessels Area 71 (predominant States)	Extrapolated 2002 Catch – Area 71 (56%)
Commercial				
Trawl Fishery	3 018 (Perak/ Salangor)	297 421 mt	3 106 (Sabah)	378 536 mt
Purse Seiners	237 (Perlis/Perak)	112 266 mt	661 (Terengganu/ Sabah)	142 883 mt
Sub-total	3 255	409 687 mt	3 767	521 419 mt
Artisanal				
Drift gillnet	7 269	58 064 mt	8 911	73 900 mt
Hook and line	530	20 915 mt	3 859	26 618 mt
Bag net	185	10 094 mt	320	12 846 mt
Sub-total	7 974	89 073 mt	13 090	113 364 mt
TOTAL	11,229	498,760 mt	16,857	634,783 mt

Management measures have been put in place to take action should fisheries approach maximum sustainable yield levels; such as the moratorium on coastal fisheries licenses, policies to control increased fishing capacity (effort control), promotion of the offshore fishery, and enhanced monitoring and research on stocks nearing maximum exploitation levels.

The main management tools include the use of: *access limitations* (limited entry set along sustainable scientific effort limits); *gear restrictions* (vessel size and engine power restrictions, fishing gear restrictions, pair trawlers, beam trawlers, push nets using large mesh, etc.); *spatial restrictions*, (zonation to protect smaller fishers and minimise gear conflicts, area closures to protect nurseries, establishment of marine parks and reserves); and to a lesser extent, the use of *temporal restrictions* to protect spawning areas, etc. Management processes include:

- establishment of a comprehensive and integrated Monitoring, Control and Surveillance scheme, including data collection, legislation for restrictive measures (licensing, gear, seasons, areas, species controls, etc.), supported by appropriate enforcement and penalties;
- monitoring of catch, effort and landing data (monitoring) for scientific analysis secured through logbooks and landing reports, as an observer program is not yet in place;
- inclusion of management tools in the primary legislation (control) (Fisheries Act 1985 – amended 1993) and its regulations;
- use of surveillance mechanisms and tools for patrols and joint operations
 - 65 DoF patrol vessels, charter aircraft;

- additional support from the MECC agencies;
- protected area patrols (one of the mechanisms growing in popularity);
- pre-licensing verification of vessel and engine size, gear and its size;
- regular reporting of catches; landing checks;
- strict licensing conditions;
- highly visible and unique vessel marking requirements to facilitate identification at sea and from the air; and
- VMS for larger commercial vessels.

Although the need for conflict resolution is rare, it is addressed both through administrative processes or the courts. In the case of infractions, the Malaysian legal processes are recognized for their familiarity and understanding of the benefits of sustainable resource management and penalties for illegal fishing activities are severe⁸.

Malaysia has been one of the few countries that has recovered from the financial crisis in Asia and is again increasing its budgetary allocations directed to the fisheries sector, bringing in greater participatory management techniques and claiming greater control of its marine resources.

Challenges⁹ for future fisheries management in Malaysia include:

- overfishing in the coastal areas;
- ongoing strengthening of legislation and regulatory processes, e.g., the need to prove intent with respect to the possession of bombing and poison fishing implements; current limitations of “hot pursuit” under Malaysian law that are more restrictive than international law, e.g., only to the EEZ; implementation of port State obligations such as IOTC port inspections and data collection, etc.;
- curbing of illegal foreign fishing, i.e., incursions into Malaysian waters;
- curbing of illegal domestic fishing (both unlicensed vessels and zone incursions);
- curbing of destructive fishing practices, bombing and use of poisons;
- tighter control of charter vessels to maximize benefits to Malaysia;
- enhancement of at-sea and port inspection mechanism to address coastal and port state authorities under international law;
- enhancement of technology and use, information sharing and joint use of assets for inter-agency operations;
- enhancement of regional cooperation initiatives for research, training, information sharing, control mechanisms; and
- involvement of the stakeholders at all levels of the industry in the *planning and implementation* of management strategies.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The costs of fisheries management for Malaysia have increased considerably as it takes greater control of its marine resources, increases stakeholder consultation, addresses the growing complexity of management planning, and implementation of international and regional obligations.

Although license fees are in existence, they are not rationalized or set at a level to offset management costs. Revenues from fisheries licensing and penalties flow directly to central government revenues and are not linked to departmental management costs or budgets. However, Malaysia demonstrated its commitment to management through the increase in budgets for fisheries management and operations. Budget increases and planned infrastructure replacement for fisheries assets, continued

⁸ The penalty incurred by a foreign fishing vessel fishing illegally in Malaysian waters, on a finding of guilt, usually includes financial penalties for the Master and each crew member plus confiscation of the vessel, gear, and fish.

⁹ Flewelling, P. 2000. Fisheries Management and MCS in South Asia – Compendium of FAO Missions, January 1999 to October 2000. Written for FAO, January 2001, (not published), 258p.

BOX 2

Malaysia – The fisheries management success story of Asia

The evolution of the fisheries management system in Malaysia to the model for Asia that it is today has been the result of leadership, priority for management of the maritime resources and areas, commitment and cooperation of and between the national government, provincial, and local governments. Prior to the 1980's, fisheries in Malaysia were an exploitable, and largely uncontrolled resource. The awakening of government to the benefits of sustainable and responsible fisheries management appear to have commenced concurrently with a Canadian CIDA fisheries initiative to assist the government in taking control of its EEZ in the mid 1980s.

Tools:

The Canadian fisheries initiative provided the basic knowledge and tools for management control mechanisms for the newly declared EEZ (1984). These included: licensing of all fishers, boats and gears; vessel identification systems; the importance of and capacity for scientific stock assessments and management information collection and analysis schemes; and implementation of training and MCS activities to reduce illegal fishing by foreign and domestic fleets.

Funds:

These control mechanisms were supported by a commitment of government funds for patrol vessels to implement national development plans, and except for the period of the financial crisis (1997-2000), these funding levels for both capital construction, maintenance and operations were maintained.

Strengthening of Management Mechanisms:

The Malaysian Department of Fisheries then took the basic tools and strengthened them to better meet their requirements. They implemented a stricter zoning system to protect small, less mobile coastal fishers; set up 40 MPAs to rejuvenate stocks (1994) and enhance tourism in the sector; strengthened vessel identification requirements; implemented an inter-agency law enforcement mechanism (MECC) of national defence, customs, marine police, fisheries, and now including the new coast guard to jointly protect the EEZ; and strengthened their fisheries laws.

A strong, cohesive nationalism evolved with respect to fisheries management, with co-operation at all levels of government. This centrally controlled system was key to their success. Fishers did not always agree with management measures as stakeholder consultations were weak, but as stocks recovered (anchovy in the north west coast from a six-month fishery extending to an all year fishery after stocks recovered with the implementation of nursery/MPAs. The Department gained the trust of the fishing industry, and this still exists today.

This is not to say that Malaysia does not have any problems of IUU fishing from both foreign and national fleets, but it is better prepared and committed to address these challenges.

Malaysia has been hesitant to openly incorporate stakeholder involvement, NGO's and community groups in the management process noting the difficult learning curve of neighbouring countries and the political and sometimes corruption of the principle use of these mechanisms. It is for this reason that stakeholder involvement has been progressing more slowly following a careful professionalism of the fishery and identification of its participants prior to opening the doors for all parties to input into management.

These steps have placed Malaysia in a model position for carefully controlled sustainable fisheries management today, best prepared to face the challenges of the future, and they are still many. Malaysia has taken full advantage of the FAO FISHCODE initiative, enhanced its MCS capacity for responsible and sustainable fisheries management, and become a model for developing countries in Asia and the Pacific. The internal government commitment in Malaysia to fisheries management, in terms of financial and personnel commitment and training, is also an example for all developing countries.

involvement and commitment to regional and international fisheries management fora and implementation of agreed strategies are continuing in Malaysia. These costs are currently being borne by both the Government and stakeholders with recent increases in management costs being funded by the former.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Malaysia ratified the UNCLOS of 10 December 1982 on 14 October 1986 and the implementation of Part XI; belongs to CITES; and signed the Biodiversity Convention of 1992. Although Malaysia has not yet ratified the UN Fish Stocks Agreement or the FAO Compliance Agreement, many of the management principles are included in its legislative instruments. FAO assistance in 2000, to incorporate the principles and strategies of these instruments, was undertaken, but at the time of writing, the extent of implementation of the recommendations of this study is not known.

Malaysia concurs with the principles of the Code of Conduct for Responsible Fisheries and has taken action to develop National Plans for the implementation of International Plans of Action (IPOAs) for the:

1. *Conservation and Management of Sharks*, including data collection and shark identification;
2. *Management of Fishing Capacity* by setting a moratorium on issuance of new licenses for the coastal areas, setting fishing zones for conservation, and limiting vessels size and fishing gears;
3. Prevention, deterrence and elimination of *Illegal, Unreported and Unregulated Fishing (IUU)*, by requiring all vessels fishing in Malaysian waters to be licensed, carry the Malaysian flag and implementing a strong MCS system for compliance.

PARTICIPATION IN REGIONAL FISHERY BODIES

Malaysia currently participates in the following international organizations related to fisheries management:

- Brunei, Indonesia, Malaysia and Philippines – East Asian Growth Area (BIMP-EAGA¹⁰)
- Asia Pacific Fisheries Commission (APFIC)
- Indian Ocean Tuna Commission (IOTC)
- South East Asia Fisheries Development Centre (SEAFDEC)
- Asia Pacific Economic Commission (APEC) as a regular and active member
- FAO Bay of Bengal – Large Marine Ecosystem Project (FAO BOB-LME)
- Network of Aquaculture Centres in Asia-Pacific (NACA)
- World Fish Centre - International Scientific and Technical Centre, former ICLARM.
- Australian Centre for International Agricultural Research (ACIAR)

Malaysia reports that it can and does meet its commitments to these organizations with respect to reports and sharing of information.

SUMMARY AND CONCLUSIONS

Malaysia, a federation of 13 states and two federal territories has its 475 000 km² of EEZ, 1.5 times its land mass, and population of 21.83 million persons. Malaysia lies between the East Indian Ocean and the Western and Central Pacific Ocean. The Department of Fisheries with assistance from the inter-agency Maritime Enforcement Coordinating Committee (MECC) has the responsibility to manage the US\$1.3 billion fishery from the harvest of some 1.2 million mt by 66 000 fishers of which 32 000 operate from the 7 000 commercial fishing boats and the remainder fish from the 21 000 artisanal craft.

¹⁰ BIMP-EAGA is involved in fish marketing and trade issues.

Malaysia remains a leader in its commitment to the goal of managing its fisheries in a responsible and sustainable manner. It has developed an appropriate legislative framework that incorporates many current international fisheries principles and strategies (National Plans for IPOAs, and the Fisheries Code), and integrates new technologies for these purposes, (VMS and radar). Malaysia has a comprehensive and thoroughly legislated fisheries management regime for both coastal and offshore commercial fisheries centred mainly around a host of input controls. These mechanisms are supported by a strong and well publicized penalty system. The planning and implementation of the management strategies for all its fisheries is an example for other countries of the region. These management plans are guided by the National Fisheries Development Plan that forms part of the National Agricultural Development Policy (1992-2010).

Key challenges for Malaysia in the future include:

- Passing management costs, or part thereof, on to the stakeholders;
- Enhancing participatory management techniques in the planning and implementation of strategies;
- Addressing over capacity and over capitalization in the coastal fisheries;
- Enhanced inter-agency cooperation for management implementation support;
- Maintaining production levels with reduced involvement of Malaysian youth in the fishery;
- Incorporating legislative changes to maintain concurrence with international advances in management practices, and obligations; and
- Curbing illegal and destructive fishing practices.

Noting the above however, does not negate the considerable advancement of Malaysia in fisheries management over the past two decades, both on its own merit and efforts and taking full advantage of the external assistance, e.g., FAO FISHCODE, to become a model for developing countries in responsible and sustainable management practices.

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APPENDIX TABLES

Current management of marine capture fisheries

Level of management	% Fisheries managed	% with Fisheries management plan	% with Published regulations	Trends in the number of managed fisheries over ten years
National	All commercial fisheries	All commercial fisheries	More than 67%	unchanged
Regional	All commercial fisheries	All commercial fisheries	More than 67%	unchanged
Local	All commercial fisheries	All commercial fisheries	More than 67%	unchanged

Summary information for three largest fisheries (by volume) for fiscal year 2001/2002

Category of fishery	Fishery	Volume (MT)	Value* mil US\$	% of Total volume caught**	% of Total value caught**	Covered by a management plan? (yes/no)	# of Participants	# of Vessels
Industrial	1 Trawl	675 957	190 095 818	72.5%	36.9%	Yes (1967)	23 567	6 124
	2 Purse seine	255 149	324 761 604	27.5%	63.1%	Yes (1967)	8 074	899
Artisanal	1 Drift & gillnet	131 964	124 220 683	65.2%	66.3%	Yes (1963)	24 494	16 180
	2 Hook & line	47 533	28 065 208	23.4%	14.9%	Yes (1963)	6 489	4 389
	3 Bag net	22 940	34 989 196	11.4%	18.8%	Yes (1963)	2 899	504
Recreational	1 n.a.							

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

n.a. not available

Use of fishery management tools within the three largest fisheries

Category of fishery	Fishery	Spatial restrictions	Temporal restrictions	Gear restrictions	Size restrictions	License/limited entry	Catch restrictions	Rights-based regulations	Taxes/royalties	Performance standards
Industrial	1	Yes	Yes	Yes	No	Yes	No	No	No	No
	2	Yes	Yes	Yes	No	Yes	No	No	No	No
Artisanal	1	Yes	Yes	Yes	No	Yes	No	No	No	No
	2	Yes	Yes	Yes	No	Yes	No	No	No	No
	3	Yes	Yes	Yes	No	Yes	No	No	No	No

Costs and funding sources of fisheries management within the three largest fisheries

Category of fishery	Fishery	Do management funding outlays cover			Are management funding sources from		
		R&D	Monitoring & enforcement	Daily management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1	Yes	Yes	Yes	No	No	No
	2	Yes	Yes	Yes	No	No	No
Artisanal	1	Yes	Yes	Yes	No	No	No
	2	Yes	Yes	Yes	No	No	No
	3	Yes	Yes	Yes	No	No	No

Compliance and enforcement within the three largest fisheries

Category of fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1	Yes	No	Yes	Yes	Yes	Penalties
	2	Yes	No	Yes	Yes	Yes	Penalties
Artisanal	1	No	No	Yes	Yes	Yes	Penalties
	2	No	No	Yes	Yes	Yes	Penalties
	3	No	No	Yes	Yes	Yes	Penalties

Capacity management within the three largest fisheries

Category of fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1	Not in Offshore > 30nm	Yes	Not specified	No	
	2	Not in Offshore > 30nm	Yes	Not specified	No	
Artisanal	1	Yes <12nm	Yes	Not specified	Yes	Moratorium
	2	Yes <12nm	Yes	Not specified	Yes	Moratorium
	3	Yes <12nm	Yes	Not specified	Yes	Moratorium

Country review: Myanmar

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December 2003

INTRODUCTION

The Union of Myanmar¹, formerly Burma until 1989, gained independence from British colonial rule on January 4th, 1948. It has a coastline of some 3 000 km, which can be divided into three coastal regions: the Rakhine region to the north, facing Myanmar's most prolific shrimp grounds in the Bay of Bengal and bordering with Bangladesh; the Gulf of Mottama region (or "Ayeyarwady"), in the centre; and the Tanintharyi region to the south, facing the 800-island Myeik archipelago of the Andaman Sea and bordering with Thailand. The continental shelf spreads over some 228 751 km², and the exclusive economic zone (EEZ) has a surface area of almost half a million square kilometres (486 000 km²).² The Central Government is located in the capital city Yangon.

Population, Economy and Political Situation

In mid-2002 the population was estimated at 48.9 million, with an annual growth rate of 1.3 percent.³ Per capita consumption of fish amounts to 21.04 kg/yr and constitutes 60-70 percent of total protein intake. Some two million people derive direct benefits from the fishing industry.⁴

Myanmar is a low income country with an estimated GDP of US\$5.8 billion for the fiscal year 1999/2000. This makes it one of the poorest Asian countries. The use of a massively overvalued official exchange rate distorts Myanmar's economic data. Myanmar is a predominantly agricultural economy, with agriculture accounting for 53 percent of current price GDP and employing 66 percent of the workforce (1999/2000).⁵

The closed political situation of Myanmar and the international political pressure on the governing authorities exacerbate the difficult situation in Myanmar. Most donors cut off aid in the late 1980's, foreign investment is sagging, and some countries have imposed sanctions.⁶

POLICY FRAMEWORK

Myanmar has formulated a fishery development policy that is in accordance with national and international standards and that respects the nature of the country's resources.⁷

¹ Note: The information for this paper was gathered from many multi-media sources, the internet, and papers, some published and some being "grey literature", but a key source was a 53 page FAO Questionnaire sent to fisheries contacts in each country to assist them in formatting their responses. Data provided in these questionnaires comes from officials and Department's files, and shall be reported in this paper as "personal correspondence and discussions with Department officials".

² Source: FAO Country Fisheries Profile, 2000

³ Source: World Bank online database; www.worldbank.org/data/countrydata/countrydata.html

⁴ Source: FAO Country Fisheries Management Brief, 2001

⁵ Source: Myanmar Country Profile, 2000, The Economist Intelligence Unit.

⁶ Ibid.

⁷ Source: FAO Country Fisheries Management Brief, 2001

The principal policies and objectives of the livestock and fisheries sector are to:

- promote all-round development of the livestock and fishery sector;
- increase meat and fish production for domestic consumption and share the surplus with neighbouring countries;
- encourage the expansion of marine and freshwater aquaculture;
- upgrade the socio-economic status of livestock and fisheries communities.

The government's stated long-term strategy is centred on the sustainable exploitation of aquatic resources. The State reports it has given priority to providing support for the development of the fishing industry, with special attention being given to less costly fresh water fish, to contribute to food security. The fisheries sector is important in terms of producing value-added products and promoting economic growth.

LEGAL FRAMEWORK

The national base law regulating fisheries is the Myanmar Marine Fisheries Law of 1990. Other laws from 1989 to 1991 regulate aquaculture and freshwater fisheries respectively. The law does not identify a particular agency with a mandate to regulate marine capture fisheries. The lead agency or management body is the Department of Fisheries under the Ministry of Livestock and Fisheries, sharing responsibilities with other agencies at the national level. Both fisheries research and enforcement responsibilities fall under the aforementioned Ministry.

Legislation lays out a process, including a set series of steps for developing and implementing fishery management regulations. Individual fisheries (by species) are not legislated. Management decisions are based on biological analysis, stock assessments, monitoring and enforcement options. Legislation does not list specific objectives for fisheries management.

Legislation indirectly affecting fisheries law and management of fisheries resources includes:

- endangered species legislation
- biodiversity legislation
- coastal management legislation

Conflict resolution mechanisms are accommodated in the law, as well as multiple-user issues, within and between the fisheries sector and other sectors.

Compliance and enforcement is executed through; (i) the Navy, (ii) the Coast Guard, and, (iii) the Fisheries Department, with the latter being responsible for dockside and logbook inspections, and levying penalties. The range of penalties applicable to violations is comprehensive, ranging from small fines for first offenders, to confiscation of fishing vessels for severe offences. Penalties, including prison terms of up to ten years for violations of the fisheries law, are provided for in the law.⁸

STATUS OF THE FISHERIES

An MSY of 1.05 million mt for Myanmar waters has been established by the government, and current available datasets reported by the government suggest that this level has not yet been reached.

Offshore industrial vessels are those in excess of either 30 ft, or 12HP engines. Inshore vessels are therefore under 30 ft or vessels with engines less than 12HP. Two separation zones for fishing have been established:

- Zone 1: shoreline out to 5 nm (northern region) or 10 nm (southern region) for coastal inshore vessels,

⁸ See: The State Law and Order Restoration Council Law Amending the Myanmar Marine Fisheries Law (The State Law and Order Restoration Council Law No 16/93); 28th October, 1993. *e.g.* section 47. "Whoever violates any provision of Section 38 shall, on conviction be punished with imprisonment for a term which may extend to ten years or with fine which may extend to kyats 500 000 or with both."

TABLE 1
Commercial Fisheries in Myanmar – Overview 1999-2000

Fishery	Target species	Contrib. to commercial marine catch (%)	Tonnage landed (metric tons)
Trawl fishery	Demersal finfish & Penaeid shrimp	52.75 4.22	260 293.64 49 847.18
Purse seine fishery	Small pelagics & Anchovy (inshore)	42.71 not available	233 159.47 not available
Totals		99.68	543 300.29

Source: FAO Country Fisheries Management Brief, 2001.

TABLE 2
Fishers and their catches

Fishery	# of Vessels 2001-2002	# of Fishers 2001- 2002	Catches (Metric tons)		
			2001-2002	1997-1998	1993-1994
Offshore					
Trawl fishery ¹	n.a.	n.a.	n.a.	n.a.	n.a.
Purse seine fishery ¹	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-Total	1 999 ²	n.a.	vers.1 531 767 ³ vers.2 648 133 ²	428 924 ²	390 667 ²
Inshore/Coastal					
Motorized	12 846 ⁴	n.a.	n.a.	n.a.	n.a.
Non-motorized	13 253 ⁴	n.a.	n.a.	n.a.	n.a.
Sub-Total	vers.1 26 099 ⁴ vers.2 28 240 ²	n.a.	vers.1 62 339 ⁴ vers.2 380 650 ²	251 908 ²	209 203 ²
Total		97 839 ⁵ full t. 444 000 ⁶ part t. 1 412 000 ⁶	vers.1 594 107 ^{3,4} vers.2 1 028 783 ²	680 832	599 870

n.a. = not available

Notes:

1. Source: FAO Country Management Brief, 2001
2. Source: Government Communication, 2003
3. Figure provided by FAO Country Profile, and stands for total offshore (commercial) marine capture fisheries output.
4. Figures provided by FAO Country Profile, and stand for total small-scale marine capture fisheries vessels and output.
5. Figure provided by FAO Country Management Brief, 2001. Possibly includes inland fishermen – and certainly excludes fish farmers.
6. Source: Flewelling, 1999

- Zone 2: outer limit of Zone 1 out to the edge of the EEZ for industrial offshore vessels

Table 1 provides an overview of the main two offshore fisheries⁹:

The number of offshore (commercial) fishing vessels and participants have increased over the last ten years, while inshore fishing vessel numbers seem to have fluctuated. This trend is reflected by Flewelling (1999), who reports a 25 percent reduction in inshore vessel numbers (6 785 units) between 1997 and 1999 on the basis of supplied government data, while the latest data¹⁰ suggest a renewed increase back to 28 240 units.

The main inshore fisheries include¹¹:

- Inshore anchovy purse seine
- Driftnet
- Gillnet
- Others (hook-&-line, bag nets, lift nets, seine nets, traps, barrier nets, scoop nets)

No detailed data are available on the volumes caught by individual gear types.

⁹ Source: FAO Country Fisheries Management Brief, 2001.

¹⁰ Source: Government Communication, 2003

¹¹ Source: FAO Country Fisheries Management Brief, 2001

TABLE 3
Inshore Fisheries – Overview 2000-2001

Fishery	Target species	Contribution to total marine catch	Tonnage landed (metric tons)
Inshore purse seine	Anchovy (<i>Stolephorus</i> sp.)	Relative contribution data not available	Fishery specific landing data not available
Driftnet	High value pelagic finfish & penaeid shrimp		
Gillnet			
Other traditional gears	Demersals, pelagics, shrimp & cephalopods		
Totals		37%	380 650*

Source: FAO Country Fisheries Management Brief, 2001

* Source: Government Communication, 2003

Detailed, stock-specific data on status and trends of exploitation and resource levels for both inshore and offshore fisheries are unavailable.

MANAGEMENT ACTIVITY

The fisheries management process is reported by government to be transparent, including information sharing, advertising management meetings, stakeholder contribution to decision-making and public input, with full support of the media to release information. Over 67 percent of all marine capture fisheries are legislated and managed in some way (usually by regulatory measures), noting an increase in the number of managed fisheries over the last ten-year period. Consultation and co-management with significant devolution of management powers to stakeholders (defined as “entrepreneurs” & “local fishermen”) are accommodated in the legislation, but are not a legal requirement, nor routinely applied.¹²

It appears that no total allowable catches (TACs) for specific stocks have been established. Consequently, there is no quota system in place. Management tools are thus mostly input based, and consist of a mix of the following:

- Licensing
- Gear restrictions
- Reserved fishing zones for inshore fisheries
- Nursery area closures
- No-take zones
- Temporary area closures
- Fishing seasons
- Limited fishing days (effort control mechanisms)

Myanmar has taken advantage of FAO FISHCODE initiatives for training, but the political priority and commitment in financial and personnel terms to fully implement lessons learned is weak at this time.

Fisheries are reported as “not over fished”. Consequently, in government, there is no cause for concern regarding overcapacity, and no measures being considered to reduce fishing capacity or to limit effort. The belief of external fisheries specialists however, suggest that the lack of government priority for fisheries and subsequent lack of commitment to sustainable management, despite the efforts at the field level, lend credence to the idea that data completeness and veracity is questionable and that there is in fact an excess in capacity and effort in Myanmar.

A “comprehensive core of [MCS] components” (Flewelling, 1999) is in place. Government reports this to include a VMS system, use of observers, at-sea and on-land inspections, check point inspections, daily catch reporting and real-time electronic data recording¹³. Offences are reported to have decreased over the last five years, indicating, according to government officials, relative success regarding the MCS arrangements

¹² Source: Government Communication, 2003

¹³ Ibid.

in place. The lack of effective inter-agency mechanisms, incomplete coverage of all fisheries activities, delays in compiling and analysing data and validity of information available suggest that the system is weaker than that projected by the government.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Government funds all activities related to fisheries management, including research, MCS, and administration. Partial cost recovery occurs through licensing and tax regimes on a general basis to the central government revenue funds, and hence are not recorded or re-disbursed on a fisheries specific basis. Both funds allocated, and costs related to management are reported to have increased over the last ten years. Increased costs, which are fully assumed by central Government, are reported to be directly related to increased stakeholder consultation, monitoring needs and development of the law.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Myanmar responded favourably to the IPOA for the Management of Fishing Capacity, by putting in place: (i) a monitoring system, and (ii) a licensing regime. Myanmar is unlikely to finish the exercise of measuring total capacity in the marine fisheries by the target date of 2005, due to a number of other constraints. The country responded favourably to the IPOA to Prevent, Deter and Eliminate IUU Fishing, through its current MCS system, and claims it bans vessels from its waters that practice re-flagging to avoid regional conservation and management measures.

Myanmar is party to UNCLOS, having ratified the Convention in May of 1996, as well as the United Nations Implementation Agreement (UNIA) (*i.e.* Part XI of UNCLOS). It acceded to the FAO Compliance Agreement on the 8th September, 1994.

PARTICIPATION IN REGIONAL FISHERY BODIES

Myanmar is a member of the Southeast Asian Fisheries Development Centre (SEAFDEC), the Asia-Pacific Fisheries Commission (APFIC), and participates in the Bay of Bengal Large Marine Ecosystem Programme (BOBP-LME). Myanmar notes it provides data to regional fisheries bodies, but adds that deadlines for submissions cannot always be met due to the lack of data, lack of human resources and/or more pressing priorities.

SUMMARY AND CONCLUSIONS

Myanmar has an extensive coastline measuring 3 000 kilometres in length, supporting an EEZ of 486 000 km². It has valuable fisheries resources, of which the shrimp grounds in the north are probably the most noteworthy. A total MSY of 1.05 million mt has been estimated for its marine waters, and current marine fisheries production is approaching this level.

Fisheries are mainly managed through input controls, such as licensing schemes, with spatial, temporal and gear restrictions. A comprehensive MCS control system is reported to be in place. The structure of the fleet is difficult to evaluate due to lack of data, but it appears that the majority of the fleet consists of small, traditional, non-motorized fishing vessels. Myanmar reports that there are currently no problems related to overcapacity, over fishing or stock depletion, but this claim is questioned by external fisheries specialists as the supporting data for such a statement is incomplete, dated, and the analytical capacity is weak. The priority and enthusiasm for responsible and sustainable fisheries management at the field level is not shared by the higher level of government, and hence the positive political view of the fisheries situation is not shared by external specialists.

Myanmar has ratified the 1982 UN Convention on the Law of the Sea, the United Nations Implementation Agreement and the FAO Compliance Agreement, and indicates it has initiated a number of actions on the IPOAs.

One of the main challenges in evaluating the status of Myanmar's fisheries and associated management has been noted above, the reliability and completeness of the available data.

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APPENDIX TABLES

Current management of marine capture fisheries in Myanmar

Level of management	% Fisheries managed	% with Fisheries management plan	% with published regulations	Trends in the number of managed fisheries over the last 10 years
National	67	67	67	Increasing
Regional	33	33	33	
Local	67	67	67	Increasing

Summary information for three largest fisheries (by volume) for the fiscal year 2001/2002 in Myanmar

Category of fishery	Fishery	Volume (mt)	Value* mil US\$	% of Total volume caught**	% of Total value caught**	Covered by a management plan?	# of Participants	# of Vessels
Industrial	Commercial offshore	n.a.	n.a.	n.a.	n.a.	No	n.a.	1 999
Artisanal	Coastal inshore	n.a.	n.a.	n.a.	n.a.	No	n.a.	28 240
Recreational	n.a.							

n.a. = not available

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

Use of fishery management tools within the three largest fisheries in Myanmar

Category of fishery	Fishery	Restrictions				License/limited entry	Catch restrictions	Rights-based regulations	Taxes/royalties	Performance standards
		Spatial	Temporal	Gear	Size					
Industrial	Commercial offshore	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No
Artisanal	Coastal inshore	Yes	Yes	Yes	No	Yes	Yes	No	No	No

Costs and Funding Sources of Fisheries Management within the three largest fisheries in Myanmar

Category of fishery	Fishery	Do management funding outlays cover			Are management funding sources from		
		R&D	Monitoring & enforcement	Daily management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Commercial offshore	Yes	Yes	Yes	Yes	No	Yes
Artisanal	Coastal inshore	Yes	Yes	No	Yes	No	No

Compliance and Enforcement within the three largest fisheries in Myanmar

Category of fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	Commercial offshore	Yes	Yes	Yes	Yes	Yes	
Artisanal	Coastal inshore	Yes	No	Yes	Yes	No	

Capacity Management within the three largest fisheries in Myanmar

Category of fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Commercial offshore	No	Yes	Not known	No	
Artisanal	Coastal inshore	No	Yes	Not known	No	

Country review: Sri Lanka

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December 2003

INTRODUCTION

Sri Lanka¹, officially the Democratic Socialist Republic of Sri Lanka, and a member of the Commonwealth of Nations, is an island republic in the Indian Ocean approximately 100 km off the south-eastern coast of India. North to south it extends approximately 440 km and the greatest width is about 220 km. Sri Lanka is divided into 9 provinces and 25 administrative districts covering 65 610 km². Sri Lanka has a narrow shelf area (average 22 km) covering 27 800 km². Its 1 770 km of coastline is the base for its 517 000 km² EEZ. The recent peace accord to end internal civil strife has re-opened the north and eastern coastal areas for local fishing operations. The previous civil unrest had reduced efforts in this area and confined the fishing effort to the west and southern areas.

Sri Lanka is situated near the equator; consequently the climate is generally hot and humid except in the hill and mountain areas. The average annual temperature is 32,2°C (90°F) in the lowlands and 21,1°C (70°F) in the higher mountainous regions. Precipitation is characterized by wide seasonal and regional variations.

Sri Lanka is recovering from two decades of civil war. Currently there are several donor agencies assisting Sri Lanka recover its pre-civil war socio-economic position in the global economy, with many of these working in the fisheries sector.

Population and the Economy

Sri Lanka has a population of 19 million (2002 World Bank Web page – *Sri Lanka at a Glance*). The GDP for Sri Lanka in 2002 has been recorded as US\$16.6 billion of which agriculture provides approximately 20.2 percent.

POLICY FRAMEWORK

The Fisheries Minister has made the vision statement that Sri Lanka is to emerge as the leading nation in the Indian Ocean by the year 2008 with respect to the sustainable use of fisheries and ocean resources. He further stated that the mission was to enhance opportunities to achieve sustainable development of fisheries and ocean resources to meet the challenges of the 21st century².

The fisheries management policy of Sri Lanka is developed by the Director General for Fisheries and approved by the Minister for the Ministry of Fisheries and Ocean Resources (MFOR), and then Cabinet, if required. These are supported by the two key Acts:

- Fisheries and Aquatic Resources Act 1996 No. 2; and
- Fisheries (Regulations for Foreign Fishing Boats) Act No. 59 of 1979

and several regulations to assist in the implementation of these acts.

¹ **Note:** The information for this paper was gathered from many multi-media sources, the internet, and papers, some published and some being “grey literature”, but a key source was a 53 page FAO Questionnaire sent to fisheries contacts in each country to assist them in formatting their responses. Data provided in these questionnaires comes from officials and Department’s files, and shall be reported in this paper as “personal correspondence and discussions with Department officials”.

² MFOR web page, 2003; <http://www.fisheries.gov.lk/>.

The primary Fisheries Act has been re-written under an ongoing ADB initiative and is currently before Parliament for approval. Policies for sustainable fisheries management flow from these documents.

One of the overarching policies of the Department of Fisheries and Aquatic Resources is the *requirement for transparency, consultation and involvement of stakeholders in management planning and implementation*. Sri Lanka is a leader in full involvement of stakeholders in the management processes with collaborative management (Government and community co-management) being emphasised. Policies, objectives and legislation for Sri Lanka are subjected to an extensive and transparent consultation process involving fishers and all other involved agencies. This consultation process, focusing on consensus and voluntary compliance/agreement to management measures, is deliberate to minimise potential conflicts during the implementation of management plans. Decision-making following the consultation process is centralised and then implementation of policies, consultations and other operations are carried out by staff from regional³ fisheries offices.

Objectives for fisheries management for Sri Lanka include:

- conservation, sustainable management, and development of Sri Lanka's aquatic resources based on sound scientific advice to maximise benefits to the fishing communities and consumers;
- appropriate regulatory processes and legislative instruments for management and protection of the livelihood of fishers;
- development of supporting infrastructure (harbours, landing points) and appropriate advanced fishing technology (vessels and gear);
- support to the fishing industry through incentive and credit schemes to develop ancillary industries; and
- promotion of exports.

Sri Lanka is unique in that it utilises an integrated management approach for coastal areas, especially for designated areas under management. These are called Special Area Management (SAMs) areas. The process is lead by the Coastal Conservation Department (CCD) however, it includes the Department of Fisheries and Aquatic Resources (DFAR) and **all stakeholders** in the extensive consultation, planning and implementation processes for all matters including fisheries, road transport, zoning of lagoons and selected coastal areas for conservation, tourism, industry, and fisheries exploitation. Regional Directors are actively involved in local fisheries management committees for fisheries management and development.

The transparency and consultation processes apply equally to all other management processes with considerable time and effort expended to ensure that stakeholders "buy into" the management process and resultant agreements. These management agreements are then reflected in fisheries regulations made for each local fisheries management committee. The Committee are thus given the authority to address and manage aspects of the fishery in the designated area, under guidance from the Ministry of Fisheries and Oceans Resources.

Two key legislative and policy challenges that are included in current legislation and practices are:

- the ongoing "*open access*" concept of management (except in lagoon fisheries), whereby there are no limits on levels of national fishers and fishing permitted in Sri Lankan waters; and
- the *permission for foreign fishing vessels to land and export their large pelagics in designated fishing ports*.

³ For the purposes of this section – *national* is the whole country; *regional* includes the combined provincial areas that are formed into fisheries regions, and *local* includes local municipalities and special area management areas (SAMs), e.g., Lagoon areas.

The latter does not permit these foreign vessels to fish in Sri Lankan waters however, budgetary constraints and a lack of appropriate patrol assets for fisheries matters make monitoring and enforcement of this restriction very difficult.

LEGAL FRAMEWORK

The Fisheries and Aquatic Resources Act 1996 No. 2; and the Fisheries (Regulations of Foreign Fishing Boats) Act No. 59 of 1979 are the two core legislative instruments for management of the fisheries. Other legislations impact on fisheries management in the areas of:

- endangered species (CITES);
- export and trade;
- biodiversity;
- marine park/sanctuary legislation especially the lagoon areas and the use of Special Area Management areas through the CCD;
- fisheries port management (Ceylon Fisheries Harbour Corporation - CFHC); and
- coastal legislation under CCD and Fisheries.

International legislative instruments that underlie management decisions include:

- UNCLOS 1982;
- FAO Compliance Agreement of 1993; and
- UN Fish Stocks Agreement of 1995.

These legislations are incorporated in the new draft Fisheries Act waiting Parliamentary approval at the time of writing this report.

The structure of the Ministry of Fisheries and Ocean Resources (MFOR) is important to understand the parties involved in management. The Ministry includes several agencies that are each responsible for component activities of fisheries management. These include:

- Department of Fisheries and Aquatic Resources (DFAR) – for fisheries management generally;
- Coast Conservation Department (CCD) – for coastal conservation and infrastructure;
- Ceylon Fisheries Harbours Corporation Authority (CFHC) – for port management;
- National Aquaculture Development Authority (NAQDA) – for aquaculture and mariculture management; and
- National Aquatic Research Agency (NARA) – for scientific research in the fisheries and ocean sector; data collection and analysis for applied research for stock assessment and management purposes.

The compliance aspects of the Department are addressed through consultation processes among all the stakeholders and agencies, and then the involvement of the Navy and Police as necessary for deterrent enforcement action. This step is only undertaken after all consultation and negotiating avenues have failed. The policy of the Department is to rely chiefly on consultation and voluntary compliance, except for areas under special security arrangements.

The SAMs concept of integrated area management has a considerable influence on fisheries management planning and implementation. This model for development and management includes all activities that are ongoing in the area and provides a forum for discussion to minimise unexpected impacts and conflicts between sectors.

STATUS OF THE FISHERIES

The contribution of agriculture to the GDP is approximately 20.7 percent with the value of the fisheries being some US\$341.1 million (1996)⁴.

⁴ FAO Fisheries Country Profile 1998.

Early scientific studies indicated a total biomass of about 750,000 tonnes and sustainable yield levels at 250 000 tonnes (170 000 tonnes for pelagics and 80 000 tonnes for demersal species). Total capture fishery catches from the three major fisheries were recorded as being 232 742 tonnes in 2002 (FAO Questionnaire), of which 64 percent were taken in the coastal areas. Estimates of numbers of fishers are incomplete, but figures available indicate there are some 150 000⁵ fishers; 30 000 persons in the secondary industry, and 700 000 people being dependent on the fishing industry for their livelihood. Therefore some 880 000 derive direct or indirect benefits from the sector.

There are 26 600 fishing boats in the sector⁶ including:

- 15 022 small traditional craft (48 percent motorised) used in the lagoons and coastal areas;
- 8 334 fibreglass speedboats with kerosene outboard motors (18-24 ft and 25-40hp motors);
- 1 550 (21-24 ft) day boats; and
- 1 700⁷ larger multi-day boats (32-52 ft), some of which venture as far afield as East Africa.

The fishery has been divided into three sectors including:

- artisanal boats – traditional craft under 12ft for coastal, lagoon and inland areas;
- day boats of 12-24 ft that go further afield; and
- the multi-day boats targeting more valuable commercial fisheries.

A large foreign fishing fleet is reported to be illegally fishing in Sri Lankan waters, but due to a lack of surveillance activity this remains unconfirmed.

The civil war in Sri Lanka had several impacts on fisheries. The first was the difficulty in gathering complete and accurate data on fish catch and effort. The second was the migration⁸ of many of the larger fishing boats to the more peaceful south and west coast thus overstressing these areas. The result is that fishers started to extend their operation offshore for more than the traditional one to two day trips into what has now become a multi-day fishery with larger fishing boats being built, or extended for this fishery.

It should be noted that there are no perceptions of overexploitation of the offshore resources.

MANAGEMENT ACTIVITY

The recently initiated peace process brought with it significant potential to bring the fisheries back under sustainable management practices in Sri Lanka as these had been a very low priority during the two decades of civil unrest. The government has built 12 fish ports for industry use for fish landing, established an extensive consultation and stakeholder input mechanism for planning and in special areas (SAMs) for total integration of multi-sector activities in the area.

The Ministry of Fisheries and Oceans Resources with its several departments has several functions to execute including:

- Implementation of policies, plans and programmes in respect of the sector;
- Monitoring, control and surveillance of the EEZ;
- Rescue operations (Coast Guard);
- Administration of the acts and regulations;

⁵ This figure includes individuals involved in the aquaculture sector.

⁶ FAO Fishery Country Profile 1998.

⁷ Fishing vessel statistics come from the FAO Country Profile 1998. These figures have not changed appreciably in the last five + years due to the inability to collect complete and accurate data as a result of the civil war.

⁸ The fishers in Sri Lanka were normally migrant due to the monsoons, but this became a more permanent migration due to the civil unrest.

TABLE 1
Fishers and their catches

Category of Fishery	# of Vessels 2002	# of Fishers 2002	2002	Catch and Value 1997	1992
COMMERCIAL					
Multiday	1 614	9 684	87 360 tonnes/ \$17 400 000	62 000 tonnes/ \$15 400 000	22 000 tonnes/ \$12 000 000
Longline	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-Total	1 614	9 684	87 360 tonnes/ \$17 400 000	62 000 tonnes/ \$15 400 000	22 000 tonnes/ \$12 000 000
ARTISANAL					
FRP 18' – 23' Boats (OBM)	9 033	27 099	90 330 tonnes/ \$60 000 000	n.a.	n.a.
Traditional Craft	15 044	38 088	35 132 tonnes/ \$20 000 000	n.a.	n.a.
Beach Seine	1 328	39 840	19 920 tonnes/ \$10 000 000	n.a.	n.a.
Sub-Total	25 405	105 027	145 382 tonnes/ \$90 000 000	n.a.	n.a.
TOTAL	27 019	114 711	232 742 tonnes/ \$107 000 000	62 000 tonnes/ \$15 400 000	22 000 tonnes/ \$12 000 000

n.a. = not available.

Note: Monetary values are US\$ 2002 Equivalents.

- Development and management of marine, brackish and freshwater fisheries;
- Development assistance to the fisheries (technological and financial);
- Provision of welfare services to the fishing communities;
- Management and operation of State-owned craft;
- Resource conflict resolution;
- Fisheries research for management purposes;
- Enhanced product quality;
- Establishment and maintenance of fisheries harbours and related infrastructure (ice plants, etc.);
- Assistance for the distribution and marketing of fish;
- Training of fishers;
- Fishery housing;
- Marine Pollution Prevention;
- Coast Conservation and Protection; and
- Coastal resource management⁹.

The government has been accused of not taking an active interest in exercising its mandate, but with assistance from several donor agencies in the last few years, there has been a renewed interest and action in the fisheries sector for development. The ADB Fisheries Sector Project is addressing and implementing a comprehensive licensing system for the fisheries sector to update the current system. Control measures for access of coastal and offshore fishing boats have been addressed through licensing, albeit in an inconsistent manner. This is also the case for the artisanal fisheries, with greater attention being paid to the process in the SAMs and lagoon areas through integrated fisheries resource management committees.

The new fisheries law will provide an appropriate supporting structure for the implementation of new management strategies to address concerns of integrated coastal and offshore management, licensing, and compliance activities to enforce the laws for sustainable use and conservation purposes. The institutional strengthening component of the ADB Coastal Resource Management Project is intended to enhance

⁹ MFOR webpage <http://www.fisheries.gov.lk/>.

government capacity to address management planning and implementation in a more comprehensive manner, ultimately to benefit the fishers.

At this time approximately 1/3 – 2/3 of the fisheries fall under some form of management regime, and these are reflected in formal national fishery management plans for the fisheries in question. This planning regime is reported to be increasing in the number of fisheries that have been coming under management over the past ten years.

Sri Lanka defines overfishing as any fishing that causes depletion of particular fish stocks¹⁰.

Commercial Fisheries

The commercial fishery is divided into two sectors, the multi-day fishing mainly with drift nets and the longline fisheries targeting the small and large pelagics. These are the two most valuable fisheries, but there are no formal management plans for either fishery. The management objective for the multi-day boats is for compliance with international instruments and long term sustainability of the resources. Sustainability of the resources is the key objective for the longline fishery. These two fisheries are carried out throughout the Sri Lankan EEZ, and for the high seas. Licensing is used as a management measure for both fisheries. Conservation, species and size selectivity in the multi-species, multi-day boat fishery is addressed through mesh size regulations for the drift netters and hook size for the longliners. The key change in the multi-day fishery over the past ten years has been the introduction of licenses.

Management costs, aside from minimal license fees, are fully covered by the government through internal budgets that are being stretched due to increased costs for consultation, monitoring, enforcement and litigation, as well as conflict resolution initiatives and regulatory changes.

There is a formal dispute resolution process available if needed, however this has not been the case to date for the commercial fisheries. The compliance component of fisheries management includes graduated financial penalties, compounding of offences, suspension or revocation of licenses, refusal for re-issuance, and full removal from the fishery as deterrent mechanisms to achieve optimum compliance with the law. Other compliance monitoring tools in use include: dockside inspections, landing site inspections, and on occasion – at-sea boarding by the Navy. VMS and observer systems have not yet been used for these fisheries. Infractions are reported as increasing over the past ten years, offshore fisheries are not perceived as overexploited, consequently, there are no preventative measures being taken regarding capacity at this time.

Small-Scale Artisanal Fisheries

The stated objectives for the small-scale fisheries are similar to those for the commercial fisheries. The three categories of the multi-species small-scale fishing sector include:

- fibreglass outboard motor boats of 6-7 metres (operating up to 15 nm from land);
- traditional low powered motor and non-motorised boats (0 to 3 nm); and
- beach seines (0- 1 nm).

Regulatory measures are the key management mechanisms in place for these fisheries, as opposed to formal management plans. These aim at avoiding destructive fishing practices. Other management tools in use for these fisheries include the designation and community enforcement of marine protected areas; area closures for spawning periods or other reasons such as tourism; establishment of fishing seasons or effort controls, e.g. number of days permitted to fish for the beach seiners; gear

¹⁰ Consultation with Government Officials, Aug. 2003.

size and type restrictions, and licensing. The latter two have become more popular for management use over the past ten years.

The number of participants in these fisheries is reported to have remained relatively stable over the past ten years for reasons similar to those for the fishing boats. As for commercial fisheries the costs of fisheries management are not passed on to the fishers in any form save for the minimal license fees. Costs of management are increasing for the same reasons noted in the commercial fisheries. The consultation processes and transparency are key tools however, for successful management in the coastal areas thus justifying these increased costs.

There is a need for conflict resolution mechanisms in the small-scale and artisanal fisheries due to gear conflicts within the fishery. Formal steps for conflict resolution include:

- Appointment of an Officer by DG of DFAR to attempt to settle the dispute;
- If settled, the parties sign a memorandum setting out the terms of agreement that become binding on the parties;
- If *not* resolved, the issue goes to the Minister for resolution, and if it fails at that level – the Minister may make appropriate regulations to formalise his decision; and
- formal court procedures are the ultimate option for resolution.

The legislation includes a system whereby zones can be established for beach seines to minimise potential conflict between communities and fishers. In most other fisheries no such formal zoning system exists. Compliance measures are similar to those for the commercial fisheries and infractions are on the increase except for beach seines. The unchanged status for beach seiners is possible due to the well ensconced and accepted management practices for this fishery that have been in place for several years, including set areas for each seine and a natural closed season caused by rough seas of the monsoons.

Capacity Assessment and Management

There is a concern that there is overcapacity in the small-scale fisheries and the introduction of licensing is to assist in addressing that concern, but this has not shown the expected results to date. There have been attempts to shorten seasons, except for the beach seine fishery that is formally and naturally regulated as noted above. Capacity reduction measures appear to have utilised licensing as a reduction measure as well as the introduction of soft loans and credit to encourage alternative livelihoods.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Increased management measures, consultation and transparency have been seen over the past ten years, thus increasing the costs of management. These have been borne by the government through budget increases and donor initiatives, but it is noted that the increases have not adequately covered the costs to ensure compliance with the new regulatory and management processes. The effectiveness of the new policies and management regimes must therefore be assessed regularly in light of the decreasing availability of funding for implementation in “real” terms. At this time, recovery of a portion of resource rent or other revenue mechanisms have not been considered to reduce pressures of management costs on government.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Sri Lanka ratified the UNCLOS 1982 on 19 July 1994, the Agreement relating to implementation of Part XI of the Convention on 28 July 1995, and the UN Fish Stocks Agreement on 24 October 1996.

TABLE 2
Implementation of IPOA

INTERNATIONAL PLAN OF ACTION (IPOA)	NATIONAL ACTION TAKEN
IPOA for the conservation and management of sharks	Established shark fishing regulations Introduced fishermen awareness workshops Established a deterrent action plan
IPOA for reducing the incidental catch of seabirds in longline fisheries	Under consideration as this is not observed or reported to be a problem in the Sri Lanka fishery.
IPOA for the management of fishing capacity	Registration of fishing craft in operation Introduction of operation licensing system Modernizing the data collection system
IPOA to prevent, deter, and eliminate illegal, unreported and unregulated fishing	Established regulations on fish and fish landing Routine monitoring by DFAR MCS staff Enforcement by DFAR, but the commitment and formal reports from such actions are not available. *Note: It does not appear that there is a format for reporting on these inspections at this time.
Measures to discourage the licensing of vessels using re-flagging to avoid conservation and management measures	Established fish landing regulations for re-flagged fishing vessels; Regular port inspection; Random audits (reports not available on the above)

PARTICIPATION IN REGIONAL FISHERY BODIES

Sri Lanka reports that it is an active member of the Indian Ocean Tuna Commission (IOTC), and also the Bay of Bengal Programme – Inter-Governmental Organisation (BOBP IGO). Sri Lanka is also a member of the International Organisation of Marine Affairs Cooperation (IOMAC); Asia-Pacific Fisheries Commission (APFIC).

SUMMARY AND CONCLUSIONS

The Democratic Socialist Republic of Sri Lanka, a small island republic in the Indian Ocean close to India and the equator, has a population of 19 million, 1 770 km of coastline, and an EEZ of some 517 000 km². Total reported fisheries catch in volume for 2002 indicate approximately 232 000 tonnes taken by 150 000 fishers and some 26 000 fishing craft. Sri Lanka's management structure, infrastructure and data systems are being re-constructed to reflect the current situation through assistance from donor agencies. The legislative framework has just been re-assessed and is before Parliament for approval and the ADB and other donors are actively assisting in strengthening the Ministry of Fisheries and Ocean Resources management capacity. Despite the social and economic difficulties of the past two decades, Sri Lanka is taking steps to provide facilities for its fishers, encourage their participation and input into management processes, and implement international management and conservation agreements and principles to which it is a party. Further, Sri Lanka is taking action to establish new and effective management, licensing and conservation schemes for its internal fisheries as well as adhere to international principles and plans of action. Sri Lanka has been taking advantage of the FAO FISHCODE initiatives for training and enhancement of its knowledge base over the past few years. Unfortunately, the recent failure of the peace talks in Sri Lanka are expected to have a negative impact on the steps taken towards responsible and sustainable fisheries management if hostilities re-commence and the internal conflict takes precedence over other matters.

Sri Lanka is aware that its data system requires an overhaul for completeness and cross verification and is addressing this through donor assistance. The entire data for the area under civil strife (1/2 – 2/3 the coastal area) for the past two decades is not available at this time and will need to be assessed and updated when it becomes available. It is for this reason that the data provided must be used cautiously at this time until the system has been reactivated.

Noteworthy are the two management measures that have been tested with some degree of success in Sri Lanka – the integrated management scheme in the special management areas (SAMs), and the effectiveness of the transparent and participatory mechanisms to ensure full stakeholder participation in the management exercise, encouraging voluntary compliance by all parties. It is hoped that the benefits of donor assistance in the past few years, and especially during the short peace process, will have a lasting positive impact on the management in the project areas.

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APPENDIX TABLES

Current management of marine capture fisheries in Sri Lanka

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	33 - 67	33 - 67	67	Increasing
Regional	33 - 67	33	67	Increasing
Local	33 - 67	33	67	Increasing

Summary information for three largest fisheries (by volume) in Sri Lanka for the fiscal year 2001/2002

Category of Fishery	Fishery	Volume mil tons	Value* million US\$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	Multiday	98 510	17 400			No	9 684	1 614
	Longline	..	..			No	..	..
Artisanal	FRP 18' - 23' Boats (OBM)	90 330	60	62	66	No	27 099	9 033
	Traditional Craft	35 132	20	24	22	No	38 088	15 044
	Beach Seine	19 920	10	14	11	No	39 840	1 328
Recreational	n.a.							

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

n.a. = not available

Use of fishery management tools within the three largest fisheries in Sri Lanka

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Multiday	No	No	Yes	No	Yes	No	No	No	No
	Longline	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	FRP 18' - 23' Boats (OBM)	Yes	Yes	Yes	Yes	Yes	No	No	No	No
	Traditional Craft	Yes	Yes	Yes	Yes	Yes	No	No	No	No
	Beach Seine	Yes	Yes	Yes	Yes	Yes	No	No	No	No

n.a. = not available

Costs and funding sources of fisheries management within the three largest fisheries in Sri Lanka

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Multiday	Yes	Yes	Yes	No	No	No
	Longline	Yes	Yes	Yes	n.a.	n.a.	n.a.
Artisanal	FRP 18' - 23' Boats (OBM)	Yes	No	No	No	No	No
	Traditional Craft	Yes	No	No	No	No	No
	Beach Seine	Yes	No	No	No	No	No

n.a. = not available

Compliance and enforcement within the three largest fisheries in Sri Lanka

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Multiday	No	No	Yes	Yes	Yes	
	Longline	..	..	..	..	..
Artisanal	FRP 18' - 23' Boats (OBM)	No	No	No	Yes	Yes	
	Traditional Craft	No	No	No	Yes	Yes	
	Beach Seine	No	No	No	Yes	Yes	

Capacity management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Multiday	No	Yes	No	No	
	Longline	No	Yes	No	No	
Artisanal	FRP 18' - 23' Boats (OBM)		No	Yes	Yes	
	Traditional Craft		No	Yes	Yes	
	Beach Seine		No	Yes	No	

Country review: Thailand (Andaman Sea)

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INTRODUCTION

This paper provides general data¹ on Thailand marine capture fisheries management in the Andaman Sea.

Thailand is a peninsular country with a total land area of approximately 514 000 sq km, lying between 5°-20° N and 97°-106° E. Its maritime borders are shared with Cambodia and Vietnam in the southeast, Myanmar in the west, and Malaysia in the south. The west and north west mountains and the high eastern plain are drained into the central basin and then to the Gulf of Thailand by four river systems: the Chao Phraya; Tha Chin; Mea Klong; and the Bang Pakong. There are 23 coastal provinces surrounding the two main fishing areas, the Gulf of Thailand (17 provinces) and the Andaman Sea (6 provinces), these being in turn divided into five internal maritime regions: one of these being the Andaman Sea. The Gulf of Thailand has a maximum of 85 m and is covered by a sandy and muddy bottom. On the west coast, the Andaman Sea has a narrow continental shelf shelving deeper offshore. It has a slightly wider area in the north and a narrow area in the south; the latter area comprising mangroves and sea grasses. The bottom for the most part is sand, mud and coral remnants.

Climate is influenced by the wet southwest monsoon from May-September, with temperatures ranging from 29°-36° C and high humidity, and then by the dryer northeast monsoon from October to early May with cooler temperatures, ranging between 15°-25° C.

Population and the Economy

The population of Thailand was estimated at 63.39 million in mid-2003². The GDP was estimated at US\$ 126.4 billion in 2002. It is noteworthy that the agriculture and fisheries sector contributes approximately 10.1% to the GDP with fisheries being 2.5% of the total.

POLICY FRAMEWORK

The Department of Fisheries (DOF) of the Ministry of Agriculture and Cooperatives is the key agency responsible for fisheries management. The objectives for fisheries

¹ **Note:** The information for this paper was gathered from many multi-media sources, the internet, and papers, some published and some being “grey literature”, but a key source was a 53 page FAO Questionnaire (FAO, 2003) sent to fisheries contacts in each country to assist them in formatting their responses. Data provided in these questionnaires comes from officials and Departmental files, and shall be reported in this paper as “personal correspondence and discussions/communications with Department officials”.

² All figures on population and economics come from the World Bank, Data Development Group and its sources (including World Population Clock [www.census.gov/cgi-bin/ipc/popclockw.htm]) the from Country background information (UNESCO and WORLD BANK); ICT Infrastructure and access (ITU and UNESCO); Computers and the internet (ITU and WITSA); ICT Expenditures (WITSA); ICT business and government environment (World Economic Forum's Global Competitiveness Report 2001-2002) ratings; and Netcraft (secure servers).

management evolve from the National Economic and Social Development Plans issued by the government. Thailand is currently guided by its ninth plan (2002-2006) that continues its fisheries policies from the earlier 8th Plan with an emphasis on poverty alleviation. The following are the policy directives for fisheries:

- **Fisheries development and management inside Thai waters:** Attain fisheries production of at least 1.58 million mt/yr from marine capture fisheries; rehabilitation of the fisheries resources and environment; and reduction of by-catch and low value catch by 100 000 mt per year to maintain food security and employment for fishers;
- **Fisheries development and management outside Thai waters:** Implement regulations to govern the conduct of Thai fishing fleets in waters outside Thailand; enhance offshore fisheries development by making available approximately 3 500 vessels for these outside EEZ activities with a production target of at least 1.8 million mt annually;
- **Aquaculture development and management:** Increase production by about five percent per year from the current 550 000 mt/yr;
- **Post-harvest technology development:** Improve quality assurance and produce for export of at least one million mt per year with an annual growth rate of ten percent (carried over from earlier Plan) (Menasvata, 1997).

Although these Plans set the goals and specific objectives for fisheries and are excellent to measure outputs, the regular development of strategic plans for implementation by area or fishery are still outstanding. Annual fisheries strategies appear a bit more re-active as opposed to pro-active (Flewellling, 2001), although new initiatives are underway (e.g., EU CHARM Project on both the Andaman Sea and Gulf of Thailand) to be pro-active and enhance community co-management systems.

The legal support for fisheries policies comes from the Act Governing the Right to Fish within Thai Waters B.E., 2482 of 1939, and then the base Fisheries Act B.E. 2490 of 1947, which focused heavily on increased fisheries production. It is noteworthy that a new Fisheries Law B.E. 2545 is before Parliament at this time, and it will address many of the current fisheries concerns, including: (i) the Code of Conduct for Responsible Fisheries; (ii) UN Fish Stocks Agreement; and (iii) FAO Compliance Agreement. Further, it will introduce participatory and consultative processes of stakeholders into fisheries management. The challenge for the Government remains the actual use and implementation of the conservation clauses in the new legislation.

The key responsibilities for DOF at present are to enhance fisheries production for food security, poverty reduction, and marketing. In the new fisheries legislation the policies³ will include:

- research and development for aquaculture, stock enhancement, improved international standards for fishery products, technology transfer, and enhanced marketing;
- applied research and surveys to increase productivity and manage the utilization of aquatic resources;
- implementation and management measures for national fisheries, aquaculture, trade and compliance;
- management of international fisheries affairs.

This represents a significant enhancement of fisheries management initiatives for Thailand. A further enhancement for fisheries is the establishment of a new Department of Coastal and Marine Resources (DCMR) within the Ministry of Natural Resources and the Environment. The relationship between the responsibilities and mandates of DOF and DCMR for fisheries is still being negotiated.

³ Personal discussions with Chief, DOF Legal Division, Bangkok, Oct/03.

LEGAL FRAMEWORK

Fisheries legislation targets the following main priorities⁴:

- Conservation and sustainable management; and
- Revenue generation.

As noted above, the DOF is responsible for fisheries management, but this is to be shared in the near future with the new Department of Coastal and Marine Resources (DCMR) under the Ministry of Natural Resources and the Environment. It is expected that there will be joint responsibility for the fish and ecosystems management in the coastal areas, while DOF will maintain its sole management responsibility for the offshore and international fisheries matters.

Acts

The following acts are primary for fisheries management:

- Act Governing the Right to Fish within Thai Waters B.E., 2482 of 1939;
- Fisheries Act B.E. 2490 of 1947, which has been focused on increased fisheries production;
- Act Organizing the Activities of the Fish Market B.E. 2496; and
- the new Fisheries Law B.E. 2545 (currently before Parliament for consideration).

The act forming the Department of Coastal and Marine Fisheries is also a key piece of legislation that will impact on fisheries management in the future. The closer liaison and use of marine schools and departments of the universities for fisheries advice will also have an impact on fisheries management in the future.

Finally, legislation that indirectly impacts on fisheries management and policies includes:

- National Parks Act B.E. 2504 of 1961 (impact on marine parks and their licensing of or management of these parks);
- Wildlife Reservation and Protection Act B.E. 2535 of 1992 (Wildlife reserves in coastal and marine areas and their licensing of fishers for these areas); and
- Import and Export Act (quality standards for finished products – USA and HACCP Standards).

Although the legislation does not define fisheries management per se, it does establish clear responsibilities for management between national and regional⁵ levels. Further, stakeholders and community levels are not yet formally mandated to be involved in the decision-making processes however, the DOF has been increasing the scope of its consultation processes to include these groups in accordance with the direction contained in the Thai Constitution B.E. 2540 of 1997 whereby, although centralized in authority, all fisheries management decisions are well publicized prior to implementation.

It is noted that the Department of Harbours registers all vessels and operators while the DOF licenses only fishing gears that have a large impact on the fishery, such as: trawls, gillnets and purse seines. Many other fisheries remain unlicensed and virtually unrecorded, such as: traps, hook and line fisheries, etc (Flewwelling, 2001).

It is to be noted that implementation of fisheries legislation is the responsibility of the DOF, DCMR, Marine Police, Royal Thailand Navy and the Office of Immigration. Law enforcement remains a central authority not yet delegated to regional or local levels and the inter-agency mechanism established under an earlier National Economic and Development Plan needs to be revisited and enhanced to resolve overlapping mandates.

⁴ *Ibid.*, Bangkok, Oct/03.

⁵ In Thailand, “national” means central government; “regional” means provinces; local means the communities.

STATUS OF THE FISHERIES

The total fish production for all of Thailand in the year 2000 (the latest year of full statistics) was estimated by DOF as 3.7 million mt. The total fishery involved some 826 980 fishers using approximately 17 295 DOF registered fishing apparatus from 53 538 Department of Harbours registered fishing vessels⁶. The marine catch was valued at some 49.40 billion baht or just over US\$ 1.1 billion in 2000. Per capita fish consumption was estimated at 25-32 kg/individual.

The capture fisheries account for some 2.77 million mt, or 79% of total fisheries production⁷. The catch is classed as tropical, multi-species catch comprised mainly of sardinellas, anchovies, Indo-Pacific mackerel, scads, threadfin breams, big-eyes, and lizard fish. Catch usage falls into the following categories: a) 52% food fish, b) 31% trash fish, and c) 17% squid and cuttlefish, shrimp, shellfish and others.

Three key commercial and artisanal fisheries in the Andaman Sea area are described below. It is reported (FAO Thailand Country Profile Web Page) that 31.7% of the total marine catch is taken in the Andaman Sea. It should be noted that fisheries in the Andaman Sea are concentrated on a continental shelf wider in the north and narrowing in the south, a small portion of the total 394 000 km² shelf area of Thailand. Reported statistics for the key fisheries are as follows:

TABLE 1
Fishers and their Catches – Andaman Sea⁸

Fishery	# of Licensed fishing gear ⁹	# of Fishers	Catch & value (000 tonnes/US\$ 000 - yr 2000 \$)	
	2000	2000	2000	1996
Commercial				
Trawl	1 017	9 143	490 / 199 542	512 / 250 925
Purse Seine	415	9 971	184 / 58 713	291 / 86 941
Gillnet & Entangle Net	57	436	1 / 1 729	3 / 2 489
Sub-Total	1 489	19 550	675 / 259 984	806 / 340 355
Artisanal				
Small gillnet	194	388	28 439 / 43 377	12 615 / 21 903
Trap	10	20	4 662 / 7 871	3 439 / 5 098
Hook and Line	10	10	1 091 / 1 355	2 040 / 1 414
Sub-Total	214	418	34 192 / 52 603	18 094 / 28 415
TOTAL	1 703	19 968	34 867 / 312 587	18 900 / 368 770

Key fishing gear in the Andaman Sea area of Thailand waters¹⁰ includes:

- shrimp gillnets, bigfin squid traps, and crab gillnets in the eastern Phuket area;
- anchovy purse seines, falling nets and lift nets with lights in the same area;

⁶ It is noted that Department of Harbours licenses vessels (53 538 licensed as fishing vessels) while DOF licenses fishing gear (17 295 licensed in 2000) – this indicates a discrepancy in potential fishing pressure that has not yet been resolved between agencies.

⁷ FAO Web Page, *Thailand Country Profile* (www.fao.org/fi/fcp/en/THA/profile.htm).

⁸ Statistics provided courtesy of the Department of Fisheries, Thailand via the FAO Questionnaire 2003.

⁹ Note the fact that DOF licenses fishing gear (17 295 in 2002), and DOH registers fishing vessels (54 538, 2000) – the discrepancy between the two figures being significant. DOF figures are utilized as this is the only available recorded catch information.

¹⁰ See Chart with graphic presentation in the next section.

- purse seines with lights are most popular in the north Andaman Sea, near the border with Myanmar; and
- purse seines and falling nets, both with lights are preferred in the south, near the Malaysian border.

It has been reported that the number of fishing vessels greater than 50 gt in all of Thailand has increased over the past decade. Registered fishing gear by DOF in 2000 indicated 17 295 registered fishing gears (50% trawls; 28.4% gillnets; 7.4% surround nets; 4% push nets and others taking the remainder).

MANAGEMENT ACTIVITY

The key strategies in the National Fisheries Development Policy set the direction for management. Overall fisheries management objectives, as presented by the Minister when detailing the restructuring of the Department in late 2002 included the following:

- sustained fisheries for food security;
- improved livelihood to increase employment; and
- earning of foreign exchange through the use of responsible fisheries practices.

The central government/DOF develops fishery management plans for key fisheries. Managers are responsible, and have legal authority for implementation of measures to achieve these national policies and objectives. The fisheries management strategies¹¹ rely on the following steps:

- sound scientific base provided by the department;
- the decision-making process at the DOF;
- drafting of regulatory measures;
- publication of management strategies and new regulatory measures for discussions with stakeholders; and
- implementation and enforcement.

These are also the key challenges for the Department at this time, especially the enactment of the new legislation, its socialization to the stakeholders, and its implementation. At this time stakeholder involvement in the initial planning process and in implementation is not common, but it is increasing through assistance from donor initiatives. Management measures generally follow the “open access” policy, except for high profile fisheries such as push nets and trawlers where there is limited access in an attempt to control and reduce these fisheries.

Currently the three key commercial fisheries: trawl fishery; purse seine fishery; and gillnet and entanglement net fisheries have had periodic management plans and regulatory measures implemented since 1975¹². It is reported that more than 67% of all commercial fisheries have associated regulations reflecting management priorities, approximately 1/3-2/3 have more formal management plans, but less than 1/3 have local/provincial or community management plans. Management plans are not a tool utilized for the management of artisanal¹³ fisheries, it is more through a direct regulatory process for this sub-sector.

Specific objectives for these fisheries have been highlighted by the Government as follows:

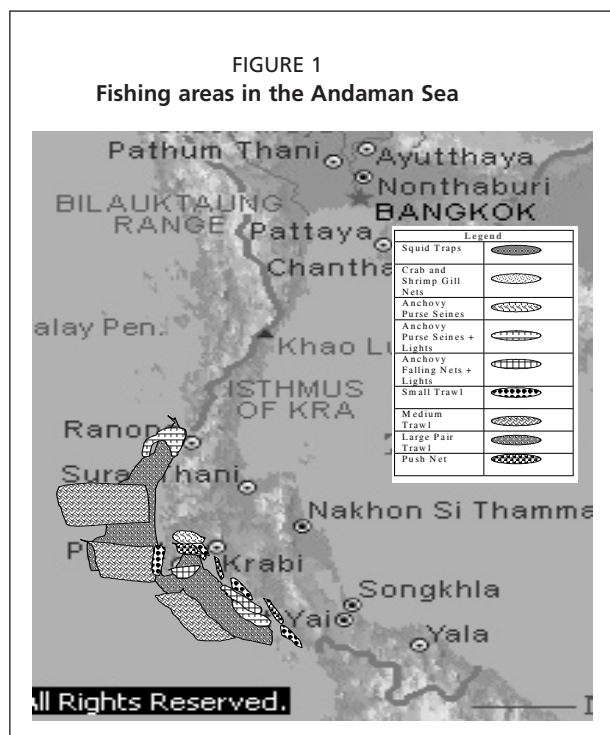
Trawl fishery

- Protection of spawning stock;

¹¹ Personal communications with DOF Fisheries Managers (Bangkok, Oct/03) referring to the Minister's speech on the re-structuring of the Department in Oct/02.

¹²and again in 1980, 1991, 1996, 1999, 2000, and 2001.

¹³ There is no definition in law for “artisanal” fishers, however the unwritten interpretation appears to include those fisheries in the coastal areas that are not licensed, e.g., non-mobile, fixed gear, or hook and line fisheries.



- Protection of juveniles; and
- Sustainability of the fishery.

Purse seine fishery

- Limit size of fish caught through minimum mesh size; and
- Control fishing areas by zone.

Encircling gillnets

- Protection of spawning mass.

Management measures that the Kingdom of Thailand has taken for implementation include:

- Prohibiting trawlers and push netters from fishing within 3 km of the coast and requiring them to be fitted with turtle exclusion devices (TEDs);
- Establishing closed seasons and areas for rehabilitation of marine stocks;
 - preservation areas for full protection as fish sanctuaries;
 - leasable areas for fixed or stationary gear;
- reserved areas for special purposes, e.g., coral reefs, sea grass beds and mangroves; and
- public fishing areas.

A recent meeting of the Communities under the EU CHARM Project is actively seeking to make advances in coastal area management. Excerpts¹⁴ are given in Box 1:

Further, DOF is carrying out other conservation measures, *inter alia*:

- Establishing artificial reefs for spawning grounds;
- Reducing excess fishing vessels (ongoing in planning stages);
- Planned freezing of construction on new trawlers and push netters;
- Establishing mesh sizes to reduce by-catches;
- Promoting community-based management;
- Strengthening research for setting sustainable fishing levels;
- Upgrading post-harvest technology to utilize the entire catch for human consumption;
- Strengthening legal, financial and institutional frameworks; and
- Other initiatives focused on aquaculture and inland fisheries development and management.

In summary, the following restrictions are utilized:

- *spatial restrictions* including MPAs, nursery area closures, no-take zones, marine reserves and other temporary closures of areas;
- *temporal restrictions* such as defined fishing seasons;
- *gear restrictions* on vessel size and gear types and mesh sizes for encircling gillnets for Indo-Pacific mackerel;
- *participatory restrictions* through licensing and in the trawl fishery – limited entry; and *groups rights* (pilot initiative) are all in use as fisheries management measures.

¹⁴ These ideas came from an MCS Work Plan prepared by Flewelling, P. in July/August 2003 as a result of discussions with the CHARM Project Team Leader.

BOX 1

Zoning for Conflict Resolution

A meeting was very recently held (17 September/03) to discuss implementable solutions to the increasing fishery resource users' conflicts.

Measures***Zoning***

Three major areas have been identified:

- Fishing grounds from 0 to 3.0 nautical miles (5 556 meters) from shore to be managed by Tambon Administrative Office;
- Fishing grounds from 3.0 to 6.0 nautical miles (11 112 meters) from shore to be managed by the Provincial Administrative Office;
- Fishing grounds 6.0 nautical miles or more from shore to be managed by Fisheries Department.

Owing to the different continental shelf's characteristics, the above zoning criterion may be applicable only to shallow seas. Where the continental shelf is steep, smaller distance from shore will be determined.

Target date

The zoning in all 22 coastal provinces must be determined by 17 November 2003 (this has been delayed until 2004).

Fishing entitlements

All fishing boats must be registered where they are intended to operate. All types of fishing gears must also be registered in the fishing ground they are intended to be used. Vessel markings will be imposed so that fishing boats are easily identifiable at distance. Commercial fishing boats may be required to install a tracking device that is GPS traceable. The role of coastal radio stations to monitor and assist fishing boats may emerge again.

Target date

The measures for fishing boat, and gear registration are expected to be worked out by 17 December 2003. The Minister aimed to issue a Ministerial decree to effect these measures by 1 January 2004.

Provincial Fishery Management Committee

The meeting foresaw the needs for a Provincial Fishery Management Committee comprising Provincial fishery officers, academic experts, representatives of small-scale and large-scale fishermen, and fisheries associations. As this larger zoning may also face the lateral demarcation lines as that of TAOs, a bay-wide committee may be a possibility.

The use of these control measures has been increasing over the past few years for new fisheries management plans¹⁵.

It has been noted that despite the increased stakeholder involvement, use of the above management measures, and conflict resolution mechanisms to resolve competition between vessel types and fisheries, the situation has not improved with respect to stabilizing stock levels. Capacity reduction measures including shortening seasons, and buyouts of licenses have had little impact on reducing the trawl fisheries,

¹⁵ Personal discussions with DOF Fisheries Managers, Bangkok, Oct/03.

BOX 2

Evolution of Fisheries Management in Thailand

The Department of Fisheries of Thailand development since 1947 has been hindered by outdated legislation and an administration focused on increased production to provide for its growing population. Until recently, there has been little incentive for conservation, or sustainable and responsible fisheries management. International agreements and pressure from neighbouring countries have encouraged the Government to revisit its focus and commence action towards control of its fleets, to enhance its MCS system, and its conservation management measures.

The new Fisheries Law BE 2445 will provide the legal base to support such action and bring Thailand up to date with respect to international principles for responsible fisheries and marine resource management. The challenge for the Government will be the commitment for the implementation of the new law.

but have been relatively successful in the purse seine and encircling gillnet fisheries. Despite the use of compliance tools including higher penalties, at-sea boarding and inspections, revocation of licenses, and increased budgets for compliance activities - the infractions in the trawl and encircling gillnet fisheries have increased over the past ten years. Funding is perceived as insufficient to address all compliance issues, possibly as a result of the “open access” management style with a continuation of new entrants, further complicated by inadequacies in the data management system.

Earlier reference has also been made to the artisanal fisheries being “open access” fisheries. Although more species-specific through the use of selective fishing gears, and with similar management measures in place, these fisheries are becoming more problematic. At present there have been no capacity surveys or measures taken to address concerns in the artisanal fishery.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Costs of fisheries management are shouldered solely by the central government with no legislated cost recovery mechanisms in place, aside from minimal fisheries licensing fees, and as noted these come from only a portion of the whole fishery. Costs for management have increased significantly over the past ten years due to increased consultation, monitoring, enforcement, litigation, and conflict resolution requirements. These costs have not yet been passed in total, or in part, on to stakeholders. The priorities of government for fisheries need to run on parallel tracks of implementing responsible sustainable fisheries and marine sector management, as well as seeking ways to obtain stakeholders’ ownership and cost sharing.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Thailand is a participant of CITES, UNCLOS 1982, and is a signatory to the Convention on Biodiversity.

Thailand has taken action to address the IPOA for conservation and management of sharks through the implementation of statistics collection, biological studies, and development of a national plan of action. Further, Thailand has commenced work on the IPOA for fisheries management capacity, but is limited by its lack of funding and may not complete the measurement and assessment prior to 2005. For the IPOA for IUU fishing, the new Fisheries Act improves vessel licensing and registration controls, and places an obligation and responsibility on the fishing vessel owner to comply with third party legislation when fishing in their waters, e.g., Thailand vessels fishing for

Indonesian companies. Commitment for action in these and other IPOAs via national action plans and funding are another challenge facing the Government.

PARTICIPATION IN REGIONAL FISHERY BODIES

It is noteworthy that the Kingdom of Thailand hosts several regional offices including the regional office for FAO fisheries and SEAFDEC. Thailand is a member of the following organizations:

- Indian Ocean Tuna Commission (IOTC);
- Southeast Asian Fishery Development Centre (SEAFDEC);
- Food and Agriculture Organization of the United Nations (FAO);
- Bay of Bengal Large Marine Ecosystem (BOBLME);
- Association of South East Asian Nations (ASEAN);
- Asia-Pacific Fisheries Committee (APFIC);
- Asian Pacific Economic Commission (APEC) – for fisheries working group on marine resources conservation.

Further, Thailand also participates in the Conservation and Management of Marine Turtles in the Indian Ocean, although not as a full member.

SUMMARY AND CONCLUSIONS

Thailand is a peninsular, tropical country, with 2 624 km of coast, a continental shelf area of 394 000 km², almost 60% of the total land area of approximately 514 000 km². Its maritime borders are shared with Cambodia and Vietnam in the southeast, Myanmar in the west, and Malaysia in the south. The Andaman Sea has a narrow continental shelf, shelving deeper offshore, slightly wider in the north and a narrow area in the south, a small fraction of the total shelf area of the country.

Marine capture fisheries account for some 2.77 million mt annually (79% of total fish production), valued at US\$ 1.1 million employing approximately 900 000 fishers using 17 295 fishing gears. Approximately 31.7% of the entire Thailand fishery is in the Andaman Sea. Fisheries policy is set through the publication of National Economic and Social Development Plans of which a National Fisheries Development Policy is a component. The DOF is the mandated fisheries management agency, but implementation is assisted by components from the Marine Police, Royal Thailand Navy, and the Office of Immigration. The establishment of the Department of Coastal and Marine Resources under the Ministry of Natural Resources and the Environment will undoubtedly result in a joint management effort for the marine resources in the coastal areas, but DOF will maintain its sole authority for offshore and high seas fisheries matters.

The legislative framework is currently undergoing considerable change to meet international agreements and principles for sustainable and responsible fisheries. The new Fisheries Law BE 2445 will provide the legal base to support such action and bring Thailand up to date with respect to international principles for responsible fisheries and marine resource management. The challenge for the Government will be the commitment for the implementation of the new law. In the Andaman Sea key commercial fisheries include: trawl fishing, purse seine fishing, gillnet and push nets in the very shallow coastal waters. Entangling nets, while small gillnets, traps and hook and lines are used in the artisanal fisheries. Participatory management planning with stakeholder involvement is in pilot stages and not yet enshrined in law, but consultation at the field level is becoming more common. Management is usually by regulatory measures using most of the available traditional restrictions: spatial, temporal, gear, participatory (licensing as a tool and limited entry for push nets and the trawl fishery) restrictions. Thailand is pilot testing, through the assistance of donor initiatives (EU CHARM Project), the utilization of group rights as a management tool. Similar measures are in use in the artisanal fishery, but the latter is totally an “open

access” fishery management regime. The costs of management are reported to be increasing due to consultation and more enforcement action, but mechanisms are not yet being considered for cost recovery or cost sharing with stakeholders.

Further challenges will emerge with respect to:

- the inter-agency liaison between the DOF and the new DCMR as well as the devolution of authority to the Districts for 0-3 nm. The latter will also require attention to enhanced capacity and funding at this devolved level; and
- the focus on high seas fish captures where Thai fishers are now encountering more stringent internationally supported rules and strategies to curb IUU fishing and with resultant challenges to the veracity of their high seas fishing operations.

The advantages of the marine reserve system as applied in Malaysia could be useful as a tool for management for Thailand’s coastal fisheries initiatives. The CHARM project and others are working at strengthening devolution of authority to provinces and districts and coastal, co-management initiatives, but this is still very much in selected areas and with the expansion of agencies and “players” in the exercise these initiatives will take time to become ensconced in the normal planning and implementing processes.

Thailand is gradually moving to adopt international principles for sustainable and responsible fisheries management, and is actively participating in regional and sub-regional fisheries organizations to address international fisheries affairs. The most recent of these was the Nov/03 bilateral agreement with Indonesia to better control the Thailand fleet that fishes in Indonesian waters. It is noted however, that its commitment to MCS and its fleet control is generally weak. Enhanced effective planning and utilization of the MCS patrol fleet for management could prove beneficial at all levels of government involvement. Application of the regional training in MCS in Songkhla would provide a significant step towards responsible fisheries management and implementation to address global and national fisheries sustainability issues, e.g., IUU fishing, management of fishing capacity, etc.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries in Thailand (Andaman Sea)

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs.
National	33 - 67	33 - 67	67	Increasing
Regional				
Local	Less than 33%	Less than 33%	Less than 33%	Unchanged

Summary information for three largest fisheries (by volume) (2000) in Thailand (Andaman Sea)

Category of Fishery	Fishery	Volume mil tonnes	Value* mil US\$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	1 Trawl	0.490	199 542	72.5	76.75	Yes	9 143	1 017
	2 Purse Seine	0.184	58 713	27.4	22.58	Yes	9 971	415
	3 Gillnet	0.001	1 729	1	0.67	Yes	436	57
Artisanal	1 Small scale gillnet	0.028439	43 377	83.1	82.46	No	338	194
	2 Trap	0.004662	7 871	13.6	14.96	No	20	10
	3 Hook & Line	0.001091	1 355	3.3	2.58	No	10	10

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

Use of Fishery Management Tools within the three largest fisheries in Thailand (Andaman Sea)

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1	Yes	Yes	Yes	No	Yes	No	Yes	No	
	2	Yes	Yes	Yes	No	Yes	No	Yes	No	
	3	Yes	Yes	Yes	No	Yes	No	Yes	No	
Artisanal	1	Yes	Yes	Yes	No	Yes	No	Yes	No	
	2	Yes	Yes	Yes	No	Yes	No	Yes	No	
	3	Yes	Yes	Yes	No	Yes	No	Yes	No	

Costs and Funding Sources of Fisheries Management within the three largest fisheries in Thailand (Andaman Sea)

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1	Yes	Yes	No	Yes	No	No
	2	Yes	Yes	No	Yes	No	No
Artisanal	3	Yes	Yes	No	Yes	No	No
	1	Yes	Yes	No	No	No	No
	2	Yes	Yes	No	No	No	No
	3	Yes	Yes	No	No	No	No

Compliance and Enforcement within the three largest fisheries in Thailand (Andaman Sea)

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	1	No	No	No	No	Yes	
	2	No	No	No	No	Yes	
	3	No	No	No	No	Yes	
Artisanal	1	No	No	No	No	Yes	
	2	No	No	No	No	Yes	
	3	No	No	No	No	Yes	

Capacity Management within the three largest fisheries in Thailand (Andaman Sea)

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1	Yes	Yes	Yes	Yes	
	2	No	Yes	No	Yes	
	3	No	Yes	No	Yes	
Artisanal	1	No	No	No	No	
	2	No	No	No	No	
	3	No	No	No	No	

Country review: Bahrain

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September, 2004

INTRODUCTION

Bahrain is a small island state on the western side of the Gulf that separates the Arabian Peninsula and Iran and, as such, has a long and well-established history of maritime activity, including fishing.

The sea area and coastline of Bahrain that borders the Arabian Gulf is characterized by extreme meteorological and hydrological conditions with water temperatures reaching over 35°C during summer months (air temperatures of over 50°C), very high evaporation rates and high salinities. Seasonal variation in hydrological parameters is also high with water temperatures varying from around 18°C in winter to 35°C in summer. As a result, and also as a result of the small area of Bahrain's territorial waters, a significant number of the fish species found more generally in Gulf waters utilize Bahrain's territorial waters on a seasonal basis, often for spawning, although some major species are found in the area throughout the year. Bahrain therefore shares many of its fish stocks with other countries of the region.

All fisheries in Bahrain are artisanal in nature with no large-scale industrial fisheries being undertaken. Previous large-scale industrial shrimp fishing was banned in 1998. Recreational fishing (mainly from boats) is growing in popularity with a small charter boat fleet developing to take sport fish such as large pelagics and demersal species.

Management of fisheries in Bahrain has been undertaken since at least the 1960s although management practices continue to be relatively simple and often have a combined focus of fish stock and marine environmental protection and fishermen's welfare and social issues. Although fisheries are insignificant from an economic point of view in Bahrain, they are often seen as being of heritage value since the early economy (pre-1960) very much depended on fishing and trading activities.

Bahrain is currently facing a number of challenges with fisheries management issues. Marine habitat destruction (particularly from land reclamation) has become a major area of concern while enforcement of fisheries regulations has been increasingly ineffective, resulting in a significant amount of illegal fishing. However, steps have recently been taken (including an artificial reef development program and the setting up of a Fisheries Enforcement Committee) which is addressing these problems and, in particular, is bringing the illegal fishing problem under control. The recreational fishing sector, while rapidly growing in popularity, is essentially unregulated and unmonitored but may be taking a significant quantity of the more important commercial fish species.

The management and rehabilitation of Bahrain's marine environment generally, including its fish stocks therefore poses significant problems for the national management authority, a task that is not made easier by the need to share such management with regional authorities and the lack of any explicit management planning process for any fishery.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Bahrain is the Directorate of Fisheries and Marine Resources (DFMR). The DFMR administers the

basic national fisheries legislation, which is the Amiri Decree on Fisheries of 1981 and the subsequent, various Ministerial Decrees. The flavor of the Amiri decree is very much concerned with fisheries administration and overall policy objectives of fisheries management in Bahrain are not explicitly stated within this basic Law.

As general marine environmental issues become more important in addressing fisheries and fish stock management (particularly issues such as land reclamation and coral reef destruction), the DFMR is increasingly working with national environmental agencies on these problems. This is usually done through formal co-ordination mechanisms by the DFMR being represented on various inter-agency Committees.

There are currently no management plans in place for any of Bahrain's fisheries. A previous attempt in 1994 at introducing a management planning process involved the preparation by DFMR (then called Directorate of Fisheries) of an internal paper entitled "A marine resource management plan for Bahrain: addressing user-identified priorities with the project management approach." The overall objective stated in this plan was to minimize social conflict and a number of strategies were elaborated to address key fisheries management issues. However, this initiative was not pursued.

Some research that supports fisheries-related initiatives is undertaken by DFMR. However, because DFMR has extremely limited resources, it usually only becomes involved in basic research if information is critical, the results directly support fisheries management, and research is not being addressed by other agencies (such as universities). DFMR focuses on applied research with direct consequences for management, such as stock assessment studies, environmental monitoring and socio-economic surveys.

Dialogue between the DFMR and fishermen on fisheries management (and social) issues is well developed although few formal mechanisms exist for stakeholder comment and input into fisheries management policy and decision-making. To facilitate the informal dialogue, commercial fishermen organized a Fishermen's Committee in 1998 to represent their views¹. This committee represents some, but not all commercial fishermen, and has had various meetings with DFMR officials.

Commercial fishermen also have direct access to the Director of DFMR and all above him (including the Minister). They have even occasionally sought and have been granted audience with the Amir.

Subsidization to Bahrain's fishermen has been, and continues to be an important part of the Government's fisheries management activities, although it is increasingly recognized that such subsidies are not appropriate in an environment where many stocks are declining. However, to reduce social conflict, the government is continuing a modest loan scheme for fishermen. Also, there are no resources available to develop ports, only to maintain them. Despite this, efforts continue to upgrade primitive vessel landing sites.

The DFMR also involves itself in the policy issues of fish export in an effort to control trade flows. There are currently export controls on fish, crabs, shrimp, lobster, cuttlefish and oysters. DFMR carries out regular checks of the local market to assess landings of these species and to make value judgments as to whether the landings are surplus to domestic consumption requirements. If there is a surplus, DFMR can issue export permits for that surplus on application. These permits are on a per shipment basis. In 1998, a total of 2 149 export permits were issued.

International fisheries issues are the responsibility of the DFMR. However, regional co-operation is weak or virtually non-existent, both on a bilateral basis and through mechanisms such as the regional fisheries commission, RECOFI. Bahrain ratified the

¹ Only nationals of Bahrain are permitted to own fishing vessels and be involved in consultative mechanisms. However, the sector is heavily dependent on expatriate labor, particularly fishermen from India, Bangladesh, Iran and elsewhere. This dependence is often seen as a potential problem for local manpower development within the fishing industry.

UN Convention on the Law of the Sea (UNCLOS) in 1985 but has not ratified the UN Fish Stocks Agreement nor the FAO Compliance Agreement.

LEGAL FRAMEWORK

The basic Law that addresses fisheries management issues and provides authority to the management agency is the Amiri Decree of 1981 and its subsequent Ministerial Decrees. Although this basic fisheries Law has not been formally updated since 1981, it is, in effect, regularly updated through the mechanism of issuing additional Ministerial Decrees as needed to address specific issues. Responsibility for administration of the Amiri Decree on Fisheries, and subsequent Ministerial Decrees, lies with the DFMR.

Bahrain ratified UNCLOS at an early date and its territorial seas are defined through the UNCLOS process with marine boundaries having been established with all neighbouring States. A long-standing dispute with neighbouring Qatar over the territorial waters boundary was finally settled in 2000 in the Court of International Settlements in The Hague.

A range of other legislation impacts on fisheries management outcomes within the country with national environmental legislation (including that legislation that implements international environmental agreements) being particularly important.

Local legislation regulating coastal development and the operation of fisheries infrastructure, such as ports, markets, landing sites etc, also impacts significantly on fisheries management legislation. The coastal development legislation and processes is particularly important in impacting on fisheries resources and their management, given the extensive coastal development that is occurring in Bahrain.

STATUS OF THE FISHERIES

Total fish landings in Bahrain have more than doubled since 1980 (from 5 115 tonnes in 1980 to 11 230 tonnes in 2001) but are still modest and do not meet the total fish supply for the country. Landings peaked in 1996, at 12 940 tonnes. However, the species mix has changed significantly during this time, with declines in shrimp catches being offset by increases in the catch of crabs and finfish. Many fish species, as well as crabs, are now landed whereas in the past these species were discarded and this change in catch retention has influenced the landings mix significantly. Local landings for 2001 were composed primarily of shrimp (1 359 tonnes), rabbitfish, *Siganus* spp. (1 899 tonnes), and crab (2 556 tonnes). For certain preferred fish species, landings have declined over the last decade, in common with other areas of the Gulf. Landings of orange-spotted grouper for example (*Epinephelus coioides*, local name *hamoor*) peaked in 1989 at 1 077 tonnes, but fell to 300 tonnes in 1998. Landings have since recovered to 794 tonnes in 2001 although it is believed that the majority of these landings now come from outside of Bahrain's territorial waters and that catch rates have fallen significantly.

In 2001, landings were primarily from shrimp trawls (approx. 39 percent), wire traps or 'gargoor' (27 percent), and fixed intertidal stake nets, or 'haddrah', (17.5 percent). Gillnet and hook-and-line accounted for the remainder. The fisheries of Bahrain are entirely artisanal in nature, following a 1998 prohibition on industrial trawling activities, with an estimated 2 300 fishing boats now operating in Bahrain waters. These are mainly fiberglass boats (85 percent), with the remainder being traditional wooden dhows. Most vessels are small with 71 percent being less than 25.9 ft in length and only 6 percent being more than 36.0 ft.

Prior to 1998, up to nine steel hulled fish trawlers operated in Bahraini waters. These vessels were supposed to fish in waters deeper than 20 m. However, they often trawled in shallow water areas, thereby causing conflict with other fishermen. As a result, these trawlers were banned on 1 June 1998.

The shrimp fishery is traditionally the most important fishery in Bahrain although catches have been declining in recent years from 3 565 tonnes in 1996 to 2 530 tonnes

TABLE 1

Characteristics of the three largest fisheries (by volume) of Bahrain. Fisheries are Shrimp and Crab Fishery (Shrimp), Stake net or 'hadra' fishery (Stake) and Coastal Fish Trap Fishery (CFT)

Category of Fishery	Fishery	Volume tonnes	Value* USD	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan? (Yes/No)	# of Participants (Est.)	# of Vessels
Artisanal	Shrimp	4 380	\$20.1m	39.0%	43.2%	No	802	229
	Stake	1 960	\$5.3 m	17.5%	11.4%	No	450	0
	CFT	3 032	\$9.4 m	27.0%	20.3%	No	1 900	1 100

* Estimated Value in 2002 US Dollars.

in 1998 to 1 359 tonnes in 2001. The share of the landings has also declined significantly from 25.7 percent of total landings in 1998 to 12.1 percent in 2001. Over 90 percent of the shrimp catch is of *Penaeus semisulcatus*. Six other shrimp species are caught, but are of minor importance. Bahrain's shrimp fishery started in 1967, with the establishment of the Bahrain Fishing Company. Catches declined sharply in the 1978/79 season, resulting in the closure of this company. Industrial fishing was re-started in the 1980/81 shrimp season, with four steel-hulled vessels. The artisanal fishery started in 1971, and continues to this day. Although artisanal boats initially pulled trawl nets by hand, by the 1990/91 season, 90 percent of these vessels used hydraulic winches and at the present time, hydraulic winches are almost universal in the fishery.

There is no ongoing program of measuring or limiting fishing capacity in any of Bahrain's fisheries although the number of licensed vessels is known.

There has only been limited stock assessment work on the fisheries of Bahrain and fisheries' modelling in the 1990s indicated that the shrimp fishery could support 73 full-time boats. However, by 1998, 402 shrimp fishing licenses were issued and there are currently in excess of 400 licensed shrimp vessels, although not all of these are active.

Finfish accounted for 65.1 percent of total landings in 2001, caught using various fishing methods, including by-catch from trawling operations, gillnet, large or small wire traps (gargoor)², and hook-and-line. Many boats use a combination of fishing gear. In 1998, there were 213 gillnet boats, 119 large wire trap boats, 419 small wire trap boats, and 462 boats that used both large and small wire traps. In addition, there were about 800 boats using hook-and-line, but only 22 of these were commercial boats. Also, there is a growing and uncontrolled recreational fishing sector that is in direct competition with commercial fishermen.

Landings of the more valuable finfish species, like shrimp landings, also have apparently declined in recent years, in common with other countries of the region. For example, grouper (*Epinephelus* spp.) annual landings dropped about 70 percent between 1989 and 1998 to 300 tonnes although they have since recovered to 794 tonnes in 2001. However, it is believed that a significant proportion of these landings now come from outside of Bahrain's territorial waters. Increased landings of secondary species such as portunid crabs and minor finfish species have supported total fish landings. These portunid crab landings (which, in the past, were regarded as a by-catch species of shrimp fishing operations) have increased in importance, with catches rising from 1 017 tonnes in 1998 to 2 556 tonnes in 2001, representing 22.8 percent of total landings.

A summary of the characteristics of Bahrain's three largest fisheries is shown in Table 1.

In summary, there are serious concerns for a number of Bahrain's fish stocks including the valuable species of shrimp and grouper. Landings and catch rates

² Like other areas of the Gulf, the issue of lost fish traps, which may continue to fish after being lost, is seen as a significant issue in Bahrain. However, no data are available on either the extent of such losses in Bahrain or the impact on fish stocks of these lost gargoor.

of these species appear to have declined, although the relative roles of fishing and marine environmental degradation in influencing their stock abundance are not well understood. Bahrain's total landings appear to have been maintained in recent years by the landing of previously discarded species, most notably portunid crabs. This shift in species composition and catch retention practices may mask more serious stock issues for the more important commercial species.

However, the greatest impediment to a better understanding of the status of Bahrain's major fish stocks is the lack of a time series of basic data on issues such as fishing effort, catches (as opposed to landings), catch rates, location of catches etc., although a separate database - Bahrain Shrimp Fishery Database - was established in 1997 for the shrimp fisheries, recording data from vessel trip log sheets that are filled in by some commercial shrimp fishermen. Without these more detailed data, a definitive analysis of the status of these important fish stocks is difficult.

MANAGEMENT ACTIVITY

There are no stated national objectives or goals regarding management of any of Bahrain's fisheries and no management plans exist for any of the country's fisheries. Of all of Bahrain's fisheries, the important shrimp fishery has been the subject of most management attention over the years with the finfish fishery only being lightly regulated.

As a result, there are regulations in place that specify the size of shrimp net and net mesh while a ministerial decree opens and closes the shrimp season annually which, in 2002 was a five-month closed season from March to July. There is a regional Gulf Cooperation Council (GCC) effort to harmonize shrimp closed seasons to six months annually although this has met with limited success. Over the last few years, Bahrain has increased its closed season from three to five months. There is also an ongoing regional shrimp stock assessment program in which Bahrain participates.

While an assessment of the status of shrimp or fish stocks is not a requirement of management, shrimp fisheries models have indicated that the shrimp fishery can support 73 full-time boats on a sustainable basis although, in 2001, the number of licenses actually issued for shrimp fishing was around six times this figure.

All commercial shrimp (as well as other fishing vessels) need to be licensed annually. Although these fisheries regulations are in-place, compliance has been limited and illegal fishing methods are commonly being used and fishing by unlicensed vessels is a significant problem.

Industrial trawlers have been banned in Bahrain since 1998 and, at the present time, artisanal vessels carry out all shrimp fishing.

Management activity in the finfish fisheries is limited to licensing of vessels as well as some operational restrictions as to closed areas for marine reserves etc. There are no capacity limitation regulations and none of Bahrain's fisheries are managed by output controls. Recreational fisheries, which are increasing in importance, are not subject to any management activity.

The Coast Guard and Police carry out the enforcement of management measures, although enforcement activities are limited and illegal fishing (including significant unlicensed fishing) remains a concern.

Marine environmental issues are of great concern to the Bahrain authorities, particularly since coastal land reclamation has accelerated in recent years and, as a result, coastal reefs and other habitat have been destroyed³. To address this issue, an artificial reef development program has been undertaken by the DFMR and has succeeded in breeding juvenile fish in the reefs. A commercial pilot project is underway to locate artificial reefs in various areas in an effort to replace destroyed natural reef areas.

³ This includes the almost total loss of mangrove areas around Bahrain.

Stakeholder participation in the development of fisheries policy and management measures is through traditional discussions, often directly with the Minister or other senior Government figure. In general, these often result in compromise solutions. Such stakeholder participation is limited to nationals only, who are the vessel owners and may or may not be actively engaged in fishing. The expatriate workers on the vessels are not involved in such dialogue on management measures.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No separate data is maintained within the Bahrain's DFMR or Coast Guard on the costs that are directly attributable to fisheries management issues. However, over the past ten years, budgets for fisheries management have certainly increased with general inflationary trends. However, in recent years, (2000-2003), the budget for fisheries issues has stagnated and may have even been declined.

A significant part of the overall budget for fisheries in Bahrain is utilized for the payment of subsidies, or the provision of subsidized services or equipment to fishers. These subsidies are often at the discretion of the Minister and are often *ad hoc* in response to specific requests from fishers. The budget for research services to support both fisheries and aquaculture activities is also included within the DFMR's fisheries budget. However, much of the research is orientated towards aquaculture activities through the National Mariculture Center (NaMaC), although some stock enhancement is carried out, primarily the annual release of small numbers of fry of important commercial fish species such as rabbitfish (*Siganus caniculatus*) into coastal waters.

Compliance is undertaken both by the Police and by the Coast Guard, who undertake at-sea inspections. Again, no separate accounting of compliance and enforcement costs is maintained within the DFMR. At-sea enforcement by the Coast Guard is also not accounted separately since fisheries related issues are generally attended to during regular sea patrols for other purposes.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Bahrain ratified the UN Convention on the Law of the Sea (UNCLOS) in 1985 but has not ratified the UN Fish Stocks Agreement nor the UN Compliance Agreement.

Although the DFMR are aware of the content of initiatives such as the Code of Conduct for Responsible Fisheries, the provisions of this, or other initiatives, have not been incorporated into national legislation.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Bahrain is an active member of the Regional Commission on Fisheries (RECOFI) and participates in most of the meetings and working groups of the Commission. However, RECOFI has not yet considered any regional management arrangements.

Since there have been no regional fisheries management initiatives emanating from RECOFI, Bahrain, therefore, has not been required to incorporate regional fisheries management issues into its national legislation.

There is, however, no legal requirement within the Bahrain fisheries legislation for fisheries management issues that may be adopted by RECOFI (or other regional body) to be incorporated into national legislation.

SUMMARY AND CONCLUSIONS

Bahrain, although having been actively involved in managing its fisheries (particularly shrimp fisheries) since the 1960s, face significant issues because of its island-state status

and the subsequent sharing of most of its fish stocks with neighbouring countries. As a result, management activity in Bahrain has not been particularly successful in leading to sustainable fish stocks and fisheries.

In addition to the problems posed by shared stocks, Bahrain's fisheries management regime has not been able to address the important national issues of capacity limitation or marine environmental degradation in its national fisheries. Compliance with the few management regulations has also been weak because of the lack of adequate enforcement. As a result, illegal fishing is a major issue in Bahrain.

At least some of the important commercial fish stocks of Bahrain (such as shrimp and grouper) have apparently declined in recent years. It also appears as if total landings have been maintained by the retention of species that were previously discarded, particularly portunid crabs. This may have masked declines in some other, preferred, finfish species.

Environmental degradation in its coastal waters is an important issue for Bahrain, particularly the loss of coastal habitat through extensive land reclamation. Such coastal habitat destruction may have contributed to the apparent declines in commercial fish stock abundance although, like many other countries in the region, adequate data is lacking to assess these impacts.

Although Bahrain has taken some initiatives in addressing issues such as illegal fishing and rehabilitation of its coastal marine environment, many problems still remain and illegal fishing in particular remains a significant issue. The limited resources of the DFMR make addressing these problems in any meaningful way a major challenge. Even if Bahrain were able to bring its fisheries under better management, the apparent shared nature of many stocks with other countries in the region and the weakness of the regional fisheries management commission, RECOFI, may limit the effectiveness of such national action in fisheries management.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries

Level of management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations*	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	< 33-%	< 33-%	< 33-%	Decreasing
Regional	n.a.	n.a.	n.a.	n.a.
Local	n.a.	n.a.	n.a.	n.a.

Use of Fishery Management Tools within the three largest fisheries

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Shrimp and crab fishery	Yes	Yes	Yes	No	Yes	No	No	No	No
	Stake net fishery	No	No	Yes	No	Yes	No	No	No	No
	Fish trap fishery	Yes	No	Yes	No	Yes	No	No	No	No
Recreational	Generic	No	No	No	No	No	No	No	No	No

n.a: not applicable

Costs and Funding Sources of Fisheries Management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Shrimp and crab fishery	Yes	Yes	Yes	No	No	No
	Stake net fishery	Yes	Yes	Yes	No	No	No
	Fish trap fishery	Yes	Yes	Yes	No	No	No
Recreational	Generic	No	No	No	No	No	No

n.a: not applicable

Compliance and Enforcement within the three largest fisheries

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Shrimp and crab fishery	No	No	No	No	No	Yes (response to reports illegal activities)
	Stake net fishery	No	No	No	No	No	No
	Fish trap fishery	No	No	No	No	No	Yes (response to reports illegal activities)
Recreational	Generic	No	No	No	No	No	No

n.a: not applicable

Capacity Management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Shrimp and crab fishery	Yes	No	Constant or decrease	No	
	Stake net fishery	No	n.a.	Increase	No	
	Fish trap fishery	Yes	No	Constant or decrease	No	
Recreational	Generic	No data but probably yes	No	No data	No	

n.a: not applicable

Country review: Djibouti

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August, 2004

INTRODUCTION

Djibouti occupies a key strategic position on the eastern side of the Red Sea, with a sea area that includes productive areas for both demersal and pelagic fish in the Gulf of Tadjoura and the Gulf of Aden. However, because of the small coastline of around 314 km, the fishing industry in Djibouti is not developed enough and has limited potential.

In recent years, Djibouti has moved to bring its small fishing industry under management with new Fisheries Laws being introduced in 2002 to provide the basis for that management. Under these laws, fishing in Djibouti waters is restricted to artisanal fishing only and, as a result, there is no industrial sale fishing currently undertaken. However, illegal industrial fishing by vessels from Yemen and other countries is known to have occurred in the past and, with limited capacity to patrol its territorial waters, the threat of such illegal fishing remains a significant issue for Djibouti.

In 2001, the artisanal fisheries of Djibouti produced around 350 tonnes of fish, much of which is sold locally although there is some trade in dried sardines with neighboring countries of Somalia and Eritrea. These landings consisted mainly of demersal and pelagic fish species with reef fish such as grouper being particularly important, comprising around 20-25 percent of the total catch by weight. This traditional artisanal fishery consists of around 2000 people with some 300 of these being directly employed on the estimated 90 vessels that comprise the fishery. A further number of subsistence fishermen do not have access to boats but fish using spears etc. directly from the coastal reefs. Landings have apparently not changed significantly for some five to ten years although precise statistics are not available. Although management of the fisheries is governed by national legislation, this management involves significant input from local villages and communities and regional chiefs are allocated specific legislative powers over fisheries within the national fisheries law.

It is widely recognized that the fisheries of Djibouti are significantly underexploited and there is a Government objective to increase landings from the current 350 tonnes to around 5 000 tonnes by 2010¹. Djibouti has the potential for significant sustainable development with landings in the period 1996-2001 being around seven percent of the estimated MSY (Kunzel *et al.*, 1996). However, Djibouti shares this development potential with its larger neighbours of Eritrea and Somalia, both of whom are also pursuing fisheries development plans, based, however, more on developing industrial fisheries. If Djibouti's plans for its fisheries sector development are to be realized, it will not only need to manage the stocks in its own waters but will also need to enter into cooperative management arrangements with these, and other countries, to ensure that overall exploitation of shared stocks remains at sustainable levels. Without such

¹ For example, Kunzel *et al.* (1996) estimated the Maximum Sustainable Yield of marine fisheries in Djibouti at around 5 000 tonnes and this has formed the basis of the Government's plans for the development of the fisheries sector. This development is being pursued through the formation of a Technical Committee for the preparation of a national program of fisheries development (the Comité technique de suivi et de pilotage de l'Étude du Programme National de Développement de la Pêche, which was formed in 2002).

cooperative arrangements, Djibouti's small fisheries sector may, in the long term, be more impacted by events outside of Djibouti waters than management intervention from within.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Djibouti is the Ministère de l'Agriculture, de l'Élevage et de la Mer, Direction d'Élevage et des Pêches (DEP). The Ministry was provided with the authority to administer and manage fisheries through Law Number 23/AN/03/5ème of 2003 which also provided the required administrative structure for the Ministry.

The policy framework for fisheries management and development is set out in the basic Fisheries Law of 2002 (Law Number 187/AN/02/4ème, Le Code des Pêches) and in various decrees and Laws which, among other things, established a Technical Committee for Fisheries Development in 2002 (the Comité technique de suivi et de pilotage de l'Etude du Programme National de Développement de la Pêche) to oversee the further development of Djibouti's fisheries sector. This Committee replaced the old Conseil national de la Mer and provides focus on the fisheries sector instead of more general maritime issues. In addition, there is an expertise-based Fisheries Consultative Council (the Conseil Consultatif de la Pêche) which provides advice to the Minister and the Director of Fisheries on fisheries issues. The Minister is required to seek the Council's advice on all matters related to fisheries management.

Fisheries management in Djibouti also has the singular advantage that most new fishermen pass through a government training program. This provides a rare opportunity to instill in the fishermen an appreciation for conservation and stock management. This has built on the traditions of participatory management, including the importance of local communities in resource decision-making.

Although the powers under the basic Law are comprehensive, they are also general and enable the Director of Fisheries and the Minister to, among other things, limit seasons, impose catch limitations (based on scientific information), limit the number of fishermen and types of gear, prepare fisheries management plans etc. The more general objectives of fisheries management however, are stated as achieving long term sustainability of fisheries resources and their environments. Protection of the marine environment is part of the basic Fisheries Law.

Access to the fisheries resources of Djibouti are limited by the basic Fisheries Law to artisanal fishermen, who must be citizens of Djibouti. Licenses are required of all fishermen and boats and the fishermen are divided into three categories. Category A are fishermen using vessels more than nine metres in length, Category B are fishermen using boats of or less than nine metres and Category C are subsistence fishermen or those without vessels. Licensing and other requirements are slightly different for each group.

There are no research capabilities in Djibouti and therefore the scientific basis on which to base management and management plans comes from technical assistance programs. Enforcement functions are weak and, although administered by the Ministry, are undertaken in collaboration with other agencies such as the navy and the gendarmerie.

Funding for the Ministère de l'Agriculture, de l'Élevage et de la Mer to undertake its responsibilities comes from annual funding allocations from the Government. Revenues from fishing activities come principally from fishing license fees, although these are small because of the small number of fishermen and the low license fees.

International fisheries issues are also the responsibility of the Ministry. Djibouti ratified the UN Convention on the Law of the Sea (UNCLOS) in 1991 but has not yet ratified the UN Fish Stocks Agreement or the FAO Compliance Agreement.

LEGAL FRAMEWORK

The basic fisheries law of Djibouti is contained within the 2002 Law Number 187/AN/02/4ème, Le Code des Pêches. This Law contains the details of the principles upon which fisheries are managed and developed. The Law contains requirements for consultation with stakeholders (through the Conseil Consultatif de la Pêche) and for the preparation of fisheries management plans. However, because of the relative recent introduction of this legislation, no management plans are currently in place.

Djibouti has committed to developing its fisheries sector based on the artisanal fishery and has established a Technical Committee for National Fisheries Development (the Comité technique de suivi et de pilotage de l'Etude du Programme National de Développement de la Pêche) to advise on how the development targets of 5 000 tonnes per annum landings might be achieved.

Because the basic Fisheries Law is relatively new, it has not yet been reviewed or revised.

STATUS OF THE FISHERIES

The generally turbid conditions of Djibouti reefs are very similar to those prevailing in the southern Red Sea. On the south coast of Djibouti, close to the border with Somalia, there is significant upwelling of nutrient-rich water, resulting in an abundance of small and large pelagic species. However, reefs in this area are poorly developed and support fewer species and lower abundances of reef-associated fish than reefs further north.

There are no large-scale fisheries in Djibouti. Much of the fishing is carried out at the subsistence level, using hook and line and target demersal and reef species. To a lesser extent, gill and throwing nets are also used. Lobsters are of minor importance, and are collected by local divers. Landed catches consist almost entirely of large fish that fetch higher prices in the market. Fish are marketed fresh and there is no processing that can be considered of much relevance.

At present, fisheries play a limited role, although subsistence fisheries are locally important. There are about 90 artisanal fishing boats, of which 75 are small, open boats (six to eight metres) powered by outboard engines. Each boat operates with an average of three fishermen over one day trips. Some 15 of the boats are longer (10-14 metres) and equipped with inboard engines. These carry an average of five fishermen each and go out for four days. Most of the fisheries are at the subsistence level and fishing effort is generally low.

The introduction of the Program for the Development of Artisanal Fisheries, initiated in 1980, resulted in substantial growth of the fisheries sector. The program supplied fishing gear, outboard engines and boats. Ten years after completion of the program, the number of fishermen had increased significantly. However, the average age of the fishermen ranged from 40 to 55, and a rejuvenation of the crew became imperative for the continued development of this sector. A revitalization program is currently underway and is being supported by new legislation.

At current levels of landings of 350 tonnes per year, Djibouti's fisheries are considered underutilized. The Direction d'Élevage et des Pêches (DEP) is currently implementing policies to recruit and train Djibouti citizens as fishermen to increase production towards a projected Maximum Sustainable Yield of 5 000 tonnes annually. While at the national level, fisheries resources are clearly underutilized, at the local level however, it may be over-utilized, especially in small restricted areas of high productivity. However, because of scarce financial and technical resources, comprehensive assessments of the main fish stocks are rare², with most studies having been undertaken in the 1970s-

² Most studies have been undertaken by international development assistance agencies, including Kunzel *et al.* (1996), Allain (1974) and Bouhlef (1988).

TABLE 1
Characteristics of the major fisheries of Djibouti

Category of Fishery	Fishery	Volume (Est. in tonnes)	Value* US\$	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan?	# of Participants (Est.)	# of Vessels (Est.)
Industrial	No industrial fisheries	Nil	Nil			n/a	nil	nil
Artisanal	Mixed artisanal	350	\$0.4m	100%	100%	No	2000**	90

* Estimated Value in 2002 U.S. Dollars.

** This includes subsistence fishermen not using vessels, but fishing from reefs and the shore using gear such as throw nets.

n/a = not applicable.

1990s. There are no comprehensive data collection activities on landings and fishing capacity although such data is necessary for monitoring progress in the development of the fisheries sector³.

Small pelagic resources (mainly the sardine, *Harengula punctata*, and anchovy, *Thrissocles baleana* and *Amentum heteroboloum*, comprise the majority of the small pelagic landings in Djibouti, which are approximately 10-15 percent of total landings. Demersal resources are mainly reef fishes including grouper (*Epinephelus* spp.), barracuda (*Sphyraena* spp.) and snappers (*Lutjanus* spp.). In total, these three species groups comprise about 60 percent of total landings with the snappers and groupers dominating. Most potential is seen in the development of the small and large pelagic resources⁴, and groupers (*Epinephelus* spp.) while reef fishes are considered to have lesser potential, partly because of the need to protect sensitive coral reef areas from damage and overexploitation.

A summary of the characteristics of the artisanal fisheries in Djibouti in 2001 is shown in Table 1. There are no industrial fisheries and there are only small recreational fisheries and no data are available.

MANAGEMENT ACTIVITY

The basic fisheries law enumerates the types of management intervention that can be implemented, although not all of these are actually in place at the present time. The types of management measures that can be utilized are:

- closed season and closed areas;
- prohibited fishing method and gear and specification of gear that may be used;
- limitation of the amount of catch
- limiting the number of fishermen
- formulation of management plans

However, in practice, there are very few of these management measures that have actually been used and the fisheries are, to a great degree, unregulated. It is generally acknowledged that this lack of control on fishing will become a major problem in the future as the industry develops. However, the Ministry is aware of this and has recently developed new fisheries legislation (see above) to provide them with the powers to begin to implement management regulations.

Enforcement of the few regulations that have been put in place is generally ineffective. Spearfishing, though legally banned, is widely practiced. Artisanal fishermen are apparently not subject to any additional limitations, and their impacts in the future will likely multiply as their gear technology improves in catching efficiency. There is already a move away from traditional practices such as the substitution of natural fibers with monofilament line, and the use of modern spear guns in place of locally made wooden ones.

³ The Ministry is currently addressing this issue.

⁴ Kunzel *et al.* (1996)

COSTS AND REVENUES OF FISHERIES MANAGEMENT

There is no data on the costs and revenues in Djibouti although it is believed, with the small and poorly developed fisheries sector, and with few regulations and limited enforcement, these costs are minimal and probably have not changed over the past five to ten years. Likewise, although there is a provision for the collection of fishing license fees, the small industry makes the revenues from this source negligible. Again, there has probably been little change in this situation over the past five to ten years.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Djibouti ratified the UN Convention on the Law of the Sea (UNCLOS) in 1991 but has not yet ratified the UN Fish Stocks Agreement or the UN Compliance Agreement.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Djibouti participates in the Convention for the Protection of the Environment of the Red Sea and Gulf of Aden (PERSGA), a UNEP initiative and is active in the activities of this convention. PERSGA, while environmentally-orientated (including the protection of the coral reefs of the area) also involves itself peripherally in fisheries matters. There is no regional fisheries commission and Djibouti's national legislation does not require that regional fisheries issues are considered in making management decisions and in preparing management plans for their fish stocks.

Djibouti signed a fisheries cooperation agreement with its neighbour, Somalia in 1986 although there have been few tangible benefits to Djibouti from this agreement to date.

SUMMARY AND CONCLUSIONS

Djibouti's fishing industry is currently small and has remained stagnant for the past five to ten years, with total landings around 350 tonnes per annum. These landings are apparently significantly less than sustainable landings, which have been estimated at around 5 000 tonnes per annum although robust stock assessments are lacking. However, based on this potential, Djibouti has committed to develop the fisheries sector in an attempt to increase landings to near this level. To support this development, Djibouti has recently introduced a number of new legislative measures, including a new basic fisheries law (2002), the formation of a technical committee to support a national program of fisheries development plan (2002) and new administrative powers for the Ministère de l'Agriculture, de l'Élevage et de la Mer (2003).

Unlike neighbouring countries, however, Djibouti is committed to retaining its fisheries as artisanal in nature and have specifically legislated for this in the recent basic Fisheries Law of 2002. Djibouti has a history and tradition of stakeholder participation in management decisions (often through local and community forums) and of commitment to the artisanal nature of its fisheries and therefore, these development directions are in accordance with those traditions.

The greatest challenge that seems to face Djibouti is that, with a small coastline and territorial sea, and with many of its stocks (particularly pelagic species) being shared with neighbouring countries, Djibouti will need to engage other countries in joint management of many of these stocks. Djibouti's plans for developing its fisheries is happening at the same time that its larger neighbours, particularly Eritrea, Yemen and Somalia are also intending to accelerate fisheries sector development. These other countries, however, are intending to develop industrial fisheries as well as artisanal fisheries (although Yemen has a stated preference for its artisanal sector) and such large scale fisheries may impact on the stocks that they share with Djibouti.

In the longer term, events in the region and outside of Djibouti's territorial waters may have a greater influence on whether Djibouti can achieve its fisheries development goals than any management intervention within Djibouti.

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APPENDIX TABLES

Current management of marine capture fisheries in Djibouti

Level of management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations*	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	nil	nil	nil	Unchanged
Regional	nil	nil	nil	Unchanged
Local	nil	nil	nil	Unchanged

Use of fishery management tools within the three largest fisheries in Djibouti

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	No industrial fisheries	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Artisanal	Mixed artisanal	No	No	Yes	No	No	No	No	No	No
Recreational	Only small recreational fisheries	No	No	No	No	No	No	No	No	No

Costs and funding sources of fisheries management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	No industrial fisheries	n.a	n.a	n.a	n.a	n.a	n.a
Artisanal	Mixed artisanal	No	Yes	Yes	Yes	No	No
Recreational	Only small recreational fisheries	No	No	No	No	No	No

Compliance and enforcement within the three largest fisheries in Djibouti

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	No industrial fisheries	n.a	n.a	n.a	n.a	n.a	n.a
Artisanal	Mixed artisanal	No	No	No	Yes	No	
Recreational	Only small recreational fisheries	No	No	No	No	No	

Capacity management within the three largest fisheries in Djibouti

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	No industrial fisheries	n.a	n.a	n.a	n.a	n.a
Artisanal	Mixed artisanal	No	No	Constant	No	
Recreational	Only small recreational fisheries	No	No	No data	No	

Country review: Egypt (Red Sea coast)

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August, 2004

INTRODUCTION

The Northern Red Sea is an important sea area both for fishing and for its unique and often spectacular marine environment. Coral reef communities often form extensive and productive reef flats which create protected habitat for many juvenile species as well as lagoons which also serve this purpose. Corals also create a protected environment for the development of coastal vegetation such as seagrasses (such as *Thalassodendron ciliatum* which is found in this zone and the Gulf of Aqaba but rarely elsewhere in the Red Sea) and salt marshes. Typical features of the western coast of the Red Sea are coastal lagoons and sheltered bays, or 'mersas', which form natural harbours and fish landing places. Several of these lagoons are fringed by mangrove (Khalil 1994). The Egyptian, as well as the Sudanese coasts are characterized by the most diverse reefs of the Red Sea. Most of the coast is bordered by fringing reefs one to three kilometres wide which are separated by deep channels from a barrier reef of 1-14 km width. The outer barrier drops steeply to several hundred meters depth.

Egypt shares its Red Sea coast with a number of other countries, and therefore many of the exploited fish stocks (particularly the large and small pelagic species) in Egypt are shared with neighboring countries. In 2002, Egypt's reported landings represented about 25 percent of total Red Sea fish landings¹ although these figures need to be approached cautiously because significant landings into ports in the Gulf of Suez and the Red Sea apparently originate from Egyptian vessels fishing in foreign waters in more southerly areas of the Red Sea and Gulf of Aden².

Marine fisheries are of lesser importance to Egypt than its major freshwater fisheries and aquaculture industries, and represent only about 17 percent of total fish production in Egypt. However, of the marine fisheries, approximately 55 percent of the total marine fish catch comes from the Red Sea and Gulf of Suez³, with the remainder coming from the Mediterranean coast. Landings from the Red Sea and Gulf of Suez have increased substantially over the past 20 years, rising from 14 700 tonnes in 1980 to 72 900 tonnes in 2002, although the proportion of high value reef species (such as the emperors) have fallen, possibly as a result of habitat degradation or overexploitation⁴. This increase in overall landings has been a result of both increased fishing effort and also from the landing into Egyptian ports of fish taken elsewhere in the Red Sea. Both industrial scale and artisanal vessels contribute to landings⁵ although the distinction

¹ The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA), reporting amalgamated landings data from FAO.

² Both Yemen and Eritrea have reported Egyptian industrial fishing vessels fishing in their territorial waters (often illegally) and it is also likely that these vessels fish in Sudanese waters.

³ In 2001, total Egyptian landings from the Red Sea and Gulf of Suez amounted to around 75 500 tonnes. There has been a steady increase in these landings over a long period, rising from 14 700 tonnes in 1980 to 40 000 tonnes in 1990 to the current level.

⁴ PERSGA, 2000.

⁵ All vessels are licensed and are required to fish, and be registered, in an area designated on their license.

between the types of vessels is not always clear. Large purse seine vessels operate in the Gulf of Suez while smaller vessels (including purse seines, handline and gillnetters) operate throughout the area. Upgrading⁶ of vessels from 'artisanal' to small 'industrial' vessels as well as an overall increase in the number of vessels has contributed to the increasing landings since 1980.

There are four fisheries centres along the Suez Gulf, six along the Red Sea Coast and three along the Gulf of Aqaba. There are only two developed fishing ports (Suez and Hurghada). The fishing fleet in 2001 was composed of 78 trawlers and 83 purse seiners in the Suez Gulf, and 711 boats using longline and hooks along the whole fishing ground, in addition to about 128 trawlers working outside Egyptian territorial waters, around the Gulf of Aden.

The catch in the Gulf of Suez constitutes 44 percent of the total landing of Egypt's Red Sea fisheries, while the Red Sea proper contributes 34 percent and 21 percent comes from outside Egyptian territorial waters. Catches from the Gulf of Aqaba comprise less than one percent of the total landings⁷. Major pelagic stocks include horse mackerel, round herring, Indian mackerel and sardines. Demersal species supporting trawl fisheries include shrimps, golden snapper, striped snapper, lizardfish, red mullet and thread-fin bream (Barrania, 1997) while reef fish, predominately the high value groupers (*Serranidae*) and emperors (*Lethrinidae*) are the most important species for the artisanal fishery. There is a marked differentiation in catches down the coast which is due primarily to different habitats, but also reflects different gear usage and market demands.

In Egypt, most fishermen originate from the Nile Delta, Fayum and other Upper Egypt provinces. Fishery resources in the Red Sea area are targeted by three groups: (i) Sedentary Bedouin fishermen, belonging to the Besharin and Ababda tribes. These are small groups of seven to ten fishermen, particularly in Foul Bay, who use small wooden boats with veranda nets, cast nets and hook and line. Production is consumed locally, with some salted or sun-dried. Most lack boats or vehicles and are therefore restrained in terms of fishing effort and market distribution; (ii) Migratory fishermen, being fishermen from Hurghada, Safaga and El-Qusseiyir who follow fishing patterns down the coast, particularly the migratory grey and red mullet, during October to February. They usually establish seasonal fishing camps and possess motorized boats supported by vehicles. It is understood that increasing numbers of professional fishermen from the Mediterranean coast are also participating in the Red Sea fishery; and (iii) the semi-industrial fleet of purse-seiners and trawlers from the north who target sardine and demersal fish respectively and are predominately based in Suez⁸. Fisheries provide an important income-earning opportunity for the first two groups (i.e. the sedentary Bedouin and the seasonal migratory fishermen) and shore access is essential to both groups. This is particularly the case for trammel net fishermen, who usually lack boats and need to walk across the shoreline and reef flat in order to set the net. Despite foreshore planning restrictions, there is already some conflict between tourism development and traditional fishing interests.

Fisheries legislation in Egypt is based on a 1983 Decree⁹ which provides the administrative basis of fisheries management. However, the legislation is generally

⁶ Upgrading of vessels has also included moving away from fishing methods, such as handlining, that targets reef species to methods such as purse seining that target small and large pelagic species.

⁷ These data are reported in the fisheries country profile prepared by FAO in October 2003. However, statistics collected by the General Authority for Fish Resources Development (GAFRD) do not appear to differentiate between the origins of landings.

⁸ In 2000, 88 percent of Egypt's industrial Red Sea and Gulf of Suez landings were made at Ataka Port in Suez according to data from PERSGA.

⁹ Decree 124/83 of 1983 on management and organization of the fisheries resources of Egypt.

inadequate in providing a basis for effective management for fisheries in Egypt. In addition, enforcement of the few laws is generally weak and, as a result, fisheries are essentially unregulated. This has led to large increases in fishing capacity as well as to concerns regarding overexploitation of a number of species, including, in recent years, a number of reef species and sea cucumber stocks¹⁰. Effective management is also hampered by the general lack of adequate assessments of major commercial fish stocks and by the complexities inherent in the shared nature of many of these stocks.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Egypt is the General Authority for Fish Resources Development (GAFRD). The GAFRD is also responsible for statistics collection and undertakes some research, although most fisheries research in Egypt is carried out by the National Institute of Oceanography and Fisheries (NIOF), which has some 1 500 staff, of which 400 are researcher and research assistants. Its research covers both living resources (fish biology, stock monitoring and assessment, fish technology, aquaculture, fishery statistics and economics, and pollution monitoring and control) and limnology and physical oceanography. It has a number of stations in Egypt and carries out ecological and fisheries surveys along the Mediterranean and Red Sea Coasts as well as inland fisheries research. It is undertaking a programme of resource evaluation, in particular an evaluation of the pelagic stocks, implemented using echo-sounder techniques. Gear research is also being undertaken for catching pelagic species with mid-water trawls.

Within the primary fisheries legislation¹¹, there is no policy objectives established for the management of marine fisheries in Egypt and the Act is primarily an administrative tool. However, the Act does specify (under Article 65) the areas in which the Minister for Agriculture (or the President) can make decrees relating to fisheries. These specific areas are broad and include, among others:

- Establishing required specifications for fishing vessels.
- Demarcation of areas in which fishing is prohibited or where specific fishing gear is prohibited.
- Specification of the species of fish or other marine life that is prohibited to catch.
- Specification of the minimum sizes and lengths of fish which it is prohibited to catch, sell or possess.
- Specification of the number and types of licenses that can be issued in each area.
- Regulation of amateur fishermen and establishment of the fees payable by them.

As well as the lack of specific policy objectives within the Fisheries Act, there is also no stated policy framework for marine fisheries by the GAFRD or the Ministry of Agriculture¹² and, therefore, marine fisheries policy needs to be inferred from actions taken (or not taken) by the GAFRD. Although there have been several Decrees and Resolutions issued since 1983 on issues relating to port development, Fishermen's Co-operatives and other administrative matters, the only Decrees and Resolutions that

¹⁰ In 1992, the GAFRD issued a Resolution (Resolution 342 of 1992) which stated that no more licenses for trawl fishing would be issued in either the Red Sea or the Mediterranean from 1st January 1994. However, it is understood that this Resolution has not been implemented effectively and additional licenses have, indeed, been issued.

¹¹ Act on fishing, aquatic life and the regulation for fish farms (Act No. 124), 1983.

¹² However, the Ministry of Agriculture has included fisheries in its overall goal of 'self-sufficiency' in many agricultural products by 2012. This would imply total fisheries production (including aquaculture and fresh water fisheries as well as marine fisheries) of around 1 362 000 by that time, compared with the 2001 production from all sources of 771 515 tonnes. While the development of all sectors is encouraged by the provisions of soft loans and the encouragement and support of Fishermen's Co-operatives, there is no defined development plan for the marine fisheries sector and no definitive policy as to how, and to what extent, marine fisheries will contribute to this overall production goal.

have been issued that relate to the management of fisheries have been (a) prohibiting trawlers from operating in both the Red Sea and the Mediterranean within the same year¹³, (b) placing a freeze on the issue of additional trawl licenses¹⁴ and (c) a closed season for trawling from 1 June to 30 September each year¹⁵. Therefore, although the power exists within the national legislation to address fisheries management issues, these powers have not been used to any great extent. As a result, the marine fisheries of Egypt are essentially unregulated¹⁶ and the implicit policy framework has been one of development rather than restriction. Soft loans and other Government support are made available to fishermen to facilitate this development focus.

Funding for the GAFRD to undertake its responsibilities comes from annual funding allocations from the Government. Revenues from fishing activities come principally from fishing license fees although there is no formal link between the annual revenues received from these sources and the annual funding of the GAFRD.

International fisheries issues are also the responsibility of the GAFRD. Egypt participates in the activities of the Convention for the Protection of the Environment of the Red Sea and Gulf of Aden (PERSGA) as well as having formal cooperation agreements in fisheries with Kuwait, Greece, Ukraine and Jordan (FAOLex, 2004). Egypt ratified the UN Convention on the Law of the Sea (UNCLOS) in 1983 and the UN Fish Stocks Agreement in 1995.

LEGAL FRAMEWORK

The basic fisheries law of Egypt is contained within Act Number 124 of 1983 on Fishing, Aquatic Life and the Regulation for Fish Farms. This Act establishes the GAFRD as the organization responsible for administering the Act and establishes an administrative framework for fisheries management. However, as noted above, it does not provide an effective management framework for marine fisheries regulation.

Various Decrees and Resolutions have been issued since 1983 related to aspects of fisheries administration but only three (see above) have related to fisheries management issues.

The GAFRD has a well established public awareness campaign to communicate with individual fishermen and, most importantly, with the Fishermen's Cooperatives. In 1994, a Resolution was issued (Resolution 232 of 1994) which formally identified Sheikhs (i.e. local community leaders) as the connecting link between the GAFRD and the Co-operatives and established guidelines for their powers in collecting license fees and fines and passing on fishermen's concerns to the GAFRD.

Although the basic fisheries legislation is relatively old, it has not yet been reviewed or revised.

STATUS OF THE FISHERIES

Egyptian marine fish landings from the Red Sea and Gulf of Suez have increased substantially over the past two decades, reaching 75 500 tonnes in 2001, compared with just 14 700 tonnes in 1980. However, a significant part of these landings (estimated at about 21 percent or 15 900 tonnes) come from Egyptian vessels operating in the territorial waters of other countries, most significantly in Yemen, Eritrea and Sudan. These increases have come from significant increases in fishing fleet capacity, including

¹³ Resolutions 376 of 2000 and 339 of 1999.

¹⁴ Resolution 342 of 1992 which stated that no more licenses for trawl fishing would be issued in either the Red Sea or the Mediterranean from 1st January 1994. However, it is understood that this Resolution has not been implemented effectively and additional licenses have, indeed, been issued.

¹⁵ This closed season appears to have been made by administrative decision rather than Decree or Resolution.

¹⁶ No management plans exist for any marine fishery in Egypt.

additional vessels as well as the upgrading of existing vessels. Catches from Egyptian waters include about 35 fish species groups, dominated by mackerel (*Scomberomorus* spp., 22 percent), lizard fish (*Saurida undosquamis*, 11 percent), snapper and emperors (*Lutjanus* spp. and *Lethrinidae*, eight percent), threadfin bream (*Nemipterus* spp., seven percent), sardine (*Sardinella* spp., six percent), grouper (*Epinephelus* spp., five percent) and grey mullet (*Mugil* spp., five percent). In recent years, landings of sea cucumber have become economically important, with landings rising dramatically from zero in 1999 to 2 300 tonnes in 2002.

Assessment of the status of marine fish stocks in Egypt is complicated both by the lack of comprehensive stock assessments of commercially important species and also by the shared nature of many of the stocks, making national assessments of limited use in framing effective management plans. In addition, there is no regional fisheries commission or other body that can take the lead in framing regional management actions based on regional assessments of the major stocks. In a review of the status of marine fisheries in the region in 2000, the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (Hariri *et al.*, 2000) listed the following as reasons for the lack of reliable stock assessment in the region generally, including Egypt:

- Lack of funds and equipment;
- Insufficient skilled technical staff;
- Lack of commitment to regional cooperation on fisheries research due to the costs involved in relation to the perceived benefits, and weak political will for regional cooperation;
- Civil unrest in some countries in the region since the late eighties has hindered scientific research and fisheries management in general;
- For some countries in the region marine fisheries are of minor importance, e.g. Jordan has virtually no jurisdiction over fisheries in the Red Sea, Egypt and Sudan depend more on inland freshwater fisheries;
- Political influence of fishermen in each country in the region is negligible due to the very low percentage they represent in the whole population;
- The absence of a competent regional fisheries organization for the PERSGA region that could act as a vehicle for facilitating data collection, analysis, sharing and harmonization of national management and development plans.

Despite these difficulties, Egypt has undertaken some assessment studies¹⁷, most of which have concluded that most fish stocks are fully or overexploited. A major UNDP/FAO project on Development of Fisheries in the general areas of the Red Sea (including Egypt) and Gulf of Aden was concluded in 1988 and this provided comprehensive data on a regional basis for many of the pelagic and demersal resources. This project, although regional in focus, provides the only data for many of the pelagic stocks, in particular, of Egypt's Red Sea coast. Despite the importance of shark and miscellaneous large pelagic species such as kingfish (Spanish mackerel), cobia and barracuda, no research has been undertaken on these stocks in either Egypt or the region in general.

Surveys for demersal stock assessment research were undertaken by the UNDP/FAO Regional Project mentioned above, over the period 1979-1983, the conclusions of which are summarized in Sanders and Morgan (1989). Between 1989-1995 FAO undertook a general survey of fisheries in Egypt's Gulf of Suez from Hurghada to Ras Banas and Foul Bay (Project: RAB/83/023/02) while the National Institute of Oceanography and Fisheries (NIOF) undertook a fisheries survey in the Gulf of

¹⁷ Most of the studies undertaken since the 1970s have been funded by external donors and have most often involved FAO technical assistance.

TABLE 1
Characteristics of the major fisheries of Egypt (Red Sea coast)

Category of Fishery	Fishery	Volume (Est. in tonnes) ¹	Value ² US\$	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan? (Yes/No)	# of Participants (Est.)	# of Vessels (Est.) ³
Industrial	Purse seine	39 300	\$59m	71.8%	70.2%	No	850	83
	Demersal trawl	15 410	\$25m	28.2%	29.8%	No	800	78
Artisanal	Red Sea artisanal fishery	18 200	\$39m	100%	100%	No	9000	711

(1) Volume includes an unknown quantity (estimated at 21% of total landings) that originates from outside of Egypt's territorial waters.

(2) Estimated Value in 2002 U.S. Dollars.

(3) Does not include vessels operating out of Egypt's territorial waters. Some of these vessels may have taken catches within Egypt's territorial waters. In 2001, 128 trawlers apparently operated, for at least part of the year, outside of Egypt's territorial waters.

Suez. Catch samples were taken during 1989-1990 and 1993-1994 from trawl, purse-seine and handline fisheries and MSY estimates calculated. The major conclusion was that all Gulf of Suez fisheries are overfished and recommendations were presented to substantially reduce fishing effort (Azab, El Hakim and Younis, 1998). Coral reef fish stocks in the Gulf of Suez Gulf were also found to be significantly overexploited and it was recommended to reduce the number of fishing boats by 41 percent (Mehanna, 1999). The giant clam stock of the Red Sea was considered to be underexploited but as fishing effort is increasing it was feared that the fishery could easily collapse (Kilada and El Ganainy, 1999).

It is understood that there is virtually no recent detailed information on the status of the principal commercial stocks in the Egyptian Red Sea.

A summary of the characteristics of the major industrial and artisanal fisheries in the Red Sea/Gulf of Suez areas of Egypt in 2002 is given in Table 1. There are only small recreational fisheries (often associated with resorts and marinas) and no data are available.

MANAGEMENT ACTIVITY

The fisheries of Egypt are essentially unregulated although it is recognized¹⁸ that most stocks are overexploited and that fishing capacity is excessive. Specific management regulations are limited to (a) prohibiting trawlers from operating in both the Red Sea and the Mediterranean within the same year, (b) a freeze on the issue of additional demersal trawl licenses¹⁹ and (c) a closed season for demersal trawling from 1 June to 30 September each year. These management measures apply to industrial trawl fisheries only and the artisanal fishery is not regulated. Although mesh sizes and size limits are included in the Regulations to the Fisheries Decree of 1983, these are more orientated to inland fisheries. Where they exist, minimum mesh sizes for marine fisheries are often set at very small sizes and are widely ignored.

All vessels are required to be licensed annually with licenses being issued for specific fishing gear and for specific areas. Fishermen are required to possess a fishermen's 'card' to enable them to fish commercially.

In the industrial fishery, management measures are enforced by the coast guard, navy and national police while local Fishermen's Cooperatives are active in working with the GAFRD in ensuring compliance with the few management measures for artisanal fishery.

¹⁸ Based on the results of surveys and stock assessment research in the late 1990s that showed most demersal and reef stocks were overexploited and which recommended reductions in fishing capacity, there has been no comprehensive assessment of the major pelagic fish stocks.

¹⁹ Resolution 342 of 1992 which stated that no more licenses for trawl fishing would be issued in either the Red Sea or the Mediterranean from 1st January 1994. However, it is understood that this Resolution has not been implemented effectively and additional licenses have, indeed, been issued.

Stakeholder participation in the development of fisheries policy and management measures and communication with fishermen is achieved through an effective public awareness function of GAFRD, who work closely with local Fishermen's Cooperatives.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

GAFRD receives an annual budget from the Government for its activities each year with this budget having remained approximately unchanged over the past five years.

Revenues from fisheries licensing and fines constitute the only significant source of fisheries-related income to the Government although, because license fees are not large, the contribution to overall costs of managing marine fisheries is small. There is no formal link between the revenues received by the Government from fisheries licensing and the budget for the GAFRD.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Egypt ratified the UN Convention on the Law of the Sea (UNCLOS) in 1983 and the UN Fish Stocks Agreement in 1995. It has not yet ratified the UN Compliance Agreement.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird bycatch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

There is no regional fisheries body covering the northern Red Sea area and therefore Egypt does not participate in regional management of fisheries. However, the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA), of which Egypt is a member, becomes involved in fisheries issues as they relate to broader marine environmental protection issues. National legislation in Egypt does not require that regional fisheries issues are considered in making management decisions and in preparing management plans for highly migratory and straddling stocks.

SUMMARY AND CONCLUSIONS

Marine fisheries production in the Red Sea and Gulf of Suez has expanded significantly over the past two decades, reaching around 72 900 tonnes by 2002, from just 14 800 tonnes in 1980. This expansion has occurred as a result of an essentially unregulated marine fisheries sector, where new vessels have entered the fishery, existing vessels have been upgraded²⁰ and, as a consequence, fishing capacity has expanded dramatically. Inevitably, this expansion has resulted in overexploitation of many commercial fish stocks and, in the late 1990s, it was concluded that all demersal and reef fisheries in the Gulf of Suez were being fished beyond their Maximum Sustainable Yields (see above). No recent assessments of the stocks of small or large pelagic resources are available, although these stocks are most likely shared with neighbouring countries, making comprehensive assessments a regional issue. Much of the expansion in landings has come from purse seining and demersal trawling activities, and has been at the expense of the traditional handline and net fisheries for reef fishes such as grouper, jacks and snappers.

While managing and reducing fishing capacity is generally recognized as a priority for the sustainable management of marine fisheries in Egypt, the ability to do this is

²⁰ Upgrading of vessels and purchase of new vessels is often assisted by the provision of Government-subsidized loans.

hampered by a number of factors. Fisheries policy is essentially development-focused and most management tools are used to promote the further expansion of fishing activities, rather than imposing limits on the growth of the sector. In addition, the basic fisheries legislation is more than 20 years old and does not provide the legislative framework for sustainable management of fisheries, for example through the principles of Ecological Sustainable Development (ESD). When these factors are combined with the general lack of knowledge of the status of the more important commercial marine fish stocks, effective management of the marine fisheries sector is extremely difficult.

Many of the stocks that Egypt's marine fishing industry exploits are undoubtedly shared with neighbouring countries and therefore, effective management of these stocks would require a regional approach rather than a national one. However, no regional fisheries body exists to provide the vehicle for such regional management although PERSGA has attempted to address fisheries issues within the broader context of regional marine environmental protection. Without such a regional fisheries body, and the information, policy framework, legal framework and political will to implement regional fisheries agreements at the national level, Egypt will continue to face significant issues with the sustainability of its marine fish stocks.

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APPENDIX TABLES

Current management of marine capture fisheries in Egypt

Level of management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations*	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	n.a.	0%	0%	Unchanged
Regional	100%	0%	0%	Unchanged
Local	n.a.	0%	0%	Unchanged

Use of fishery management tools within the three largest fisheries in Egypt

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Purse seine	No	No	Yes	No	Yes	No	No	No	No
	Demersal trawl	No	Yes	Yes	No	Yes	No	No	No	No
Artisanal	Red Sea artisanal fishery	No	No	No	No	Yes	No	No	No	No
Recreational	Only small recreational fisheries	No	No	No	No	Yes	No	No	No	No

Costs and funding sources of fisheries management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries ¹	Resource rents
Industrial	Purse seine	Yes	Yes	Yes	No	Yes	No
	Demersal trawl	Yes	Yes	Yes	No	Yes	No
Artisanal	Red Sea artisanal fishery	Yes	Yes	Yes	No	Yes	No
Recreational	Only small recreational fisheries	No	Yes	Yes	No	Yes	No

(1) Management agency receives an annual budget from the Central Govt. Fisheries license fees charged are not specifically allocated to fisheries management activities.

Compliance and enforcement within the three largest fisheries in Egypt

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	Purse seine	No	No	No	Yes	Yes	
	Demersal trawl	No	No	No	Yes	Yes	
Artisanal	Red Sea artisanal fishery	No	No	No	Yes	Yes	
Recreational	Only small recreational fisheries	No	No	No	No	No	

Capacity management within the three largest fisheries in Egypt

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing? ¹	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Purse seine	Yes	No	Decreasing	No	
	Demersal trawl	Yes	No	Decreasing	No	
Artisanal	Red Sea artisanal fishery	Yes	No	Decreasing	No	
Recreational	Only small recreational fisheries	Yes	No	Decreasing	No	

(1) No data but almost certainly decreasing for all exploited stocks

Country review: Eritrea

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August, 2004

INTRODUCTION

Eritrea occupies a key strategic position on the eastern side of the Red Sea, with an extensive sea area including approximately 355 islands. The length of its coastline is approximately 2 234 km in total, comprising 1 151 km of coast on the mainland and an additional 1 083 km of coastline to its Red Sea Islands. Eritrea claims a 12 nm territorial sea limit although the exact borders of its territorial sea remain in dispute in some areas.

Since independence in 1993 from Ethiopia, Eritrea has moved to both develop and manage its fisheries resources in accordance with the principles of Ecologically Sustainable Development. This development initially included agreements with foreign fishing vessels to enable them to undertake demersal fish (and, later, shrimp) trawling in Eritrean territorial waters during the period 1994-2001. These vessels have, since 2002, been replaced by agreements with local emerging companies who charter foreign trawlers from the region. These industrial vessels operate under close supervision, including licensing requirements related to quotas, seasons, closed areas and the presence of independent observers on board. At the same time, the artisanal fishery has slowly developed in cooperation with local village cooperatives and northern and southern Red Sea Administrative Regions, although it remains a smaller contributor to overall catches than the industrial sector.

Eritrea took the major step in 1998 of introducing a comprehensive and far-sighted Fisheries Proclamation, that includes, among other things, the designation of the Ministry of Fisheries as the management agency, the setting up of a Fisheries Advisory Committee that includes broad stakeholder representation, and including requirements of biological, economic and social analyses in management decisions. In addition, the Fisheries Proclamation allows for the protection of endangered species and sensitive marine areas, such as the extensive coral reefs of the offshore islands.

In 2003, the industrial fisheries of Eritrea contributed over 70 percent of total landings, with this being taken by 46 vessels, chartered from Egypt, Saudi Arabia and Ukraine. These landings consisted mainly of demersal and pelagic fish species although shrimp catches are an increasingly important component of the landings. The traditional artisanal fishery, on the other hand, consisted of some 3 000 people and operated over 600 small inshore vessels and has expanded steadily since independence in 1993. Management of the artisanal fisheries involves significant input from the 38 local village cooperatives (under the umbrella of six subregional apex cooperatives) and the Administrative Areas of the northern and southern Red Sea.

The fisheries of Eritrea have the potential for significant sustainable development with the landings in 2002 of around 9 000 tonnes being significantly less than the Maximum Sustainable Yield for all species, estimated in 1996 to be approximately 80 000 tonnes (see footnote 5).

The development of the fisheries sector in Eritrea to achieve its full potential is being undertaken in an orderly way and includes the joint development of industrial scale fisheries with the local artisanal sector. However, the extensive sea area of Eritrea

(including the many islands) and the pressure on the limited resources of the Ministry of Fisheries to deter illegal fishing within the country's EEZ will provide future challenges for the management authorities.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Eritrea is the Ministry of Fisheries, which was provided with the authority to administer and manage fisheries through the Fisheries Proclamation in 1998. The Ministry of Fisheries includes Departments of Fisheries Resources Development (including responsibility for Research and Statistics), Fisheries Industrial Liaison, Training and Administration.

The policy framework for fisheries management and development is set out in the Fisheries Proclamation of 1998. In that Proclamation, the Principles of Management are stated as:

- 1) The Minister shall ensure that the aquatic and coastal resources of Eritrea are conserved and managed properly:
 - to ensure that the living resources are not endangered by exploitation; and
 - with the objective of ensuring that those resources produce the optimum sustainable yield taking into account relevant environmental, economic and social factors, including the development needs of Eritrea and of the region, fishing patterns, the interdependence of stocks, the interests of other states in shared, straddling and migratory stocks and generally recommended international minimum standards.
- 2) The Minister shall ensure that the access by other states to living resource in Eritrean waters shall be controlled and managed to ensure that the combined exploitation of any particular resource by both national and foreign fishing vessels during any period does not exceed any total allowable catch for the resource for that period determined by the Minister taking into account the best scientific evidence available to the Minister and other relevant factors, including the effects of harvesting on associated or dependent species.

The Principles of Fisheries Management therefore includes the requirements of consultation with stakeholders, biological, economic and social analysis to support management decisions and ecosystem considerations.

This policy is administered by the Ministry of Fisheries through the legislatively-required establishment of a Fisheries Advisory Council. This Council consists of:

- an officer of the Ministry who is responsible for administering and enforcing the Proclamation;
- a representative of the department responsible for ports and maritime transport;
- a representative of the Navy;
- a representative of the department responsible for economic development and/or investment;
- a representative of the Research and Training Division of the Ministry;
- an elected representative of persons engaged in artisanal fishing;
- an elected representative of operators of foreign fishing vessels fishing in Eritrean waters; and
- an elected representative of operators of national commercial fishing vessels (if any).

The Principles of Fisheries Management are also enacted through Management Plans for each fishery, which are a required process under the Fisheries Proclamation. Each Fisheries Management Plan must:

- identify each fisheries resource and assess the present state of its exploitation;
- specify the objectives to be achieved in the management of the fishery;
- specify the management and development measures required to achieve the objectives; and in particular;

- specify the licensing program to be followed for the fishery; the limitations, if any, to be applied to national fishing operations and amount of fishing, if any, to be allowed to foreign fishing vessels.

The Fisheries Management Plans are a key element in the management of fisheries and are required to be reviewed regularly, with a summary required to be published and made publicly available. In preparing Fisheries Management Plans, the Minister must:

- have regard to and guided by the principles set out in the Principles of Fisheries Management of the Proclamation;
- consult with persons engaged in the fishery, local authorities, other persons and government departments affected by the plan; and
- present a draft of the plan to the Fisheries Advisory Council for its opinion.
- consult wherever feasible with the fisheries management authorities of other states in the region, and in particular, with those sharing the same or related stocks, with a view to harmonizing and improving fisheries management in the region as a whole.

Research and enforcement functions, although administered by the Ministry of Fisheries are undertaken in collaboration with other agencies. Funds and technical expertise to undertake research (particularly stock assessment research) are often sourced from foreign donors and aid programs while enforcement functions are carried out in collaboration with the Eritrean Navy.

Funding for the Ministry of Fisheries to undertake its responsibilities comes from annual funding allocations from the Government. Revenues from fishing activities come principally from royalties and fishing license fees, particularly from the industrial fishery. While there is no formal link between the annual revenues received from these sources and the annual funding of the Ministry of Fisheries, in practice the two are usually closely linked.

International fisheries issues are also the responsibility of the Ministry of Fisheries. Eritrea participates in the activities of the International Tuna Commission and is a signatory to both CITES and to the Convention on Biological Diversity. Eritrea has not yet ratified the UN Convention on the Law of the Sea (UNCLOS) or the UN Fish Stocks Agreement or the FAO Compliance Agreement. However, it has used the FAO Code of Conduct for Responsible Fisheries as the basis for its fisheries legislation and practices are broadly based on this Code.

LEGAL FRAMEWORK

The basic fisheries law of Eritrea is contained within Proclamation 104 of 1998 ('The Fisheries Proclamation') which contains the details of not only the administration of fisheries in Eritrea but also the principles upon which fisheries are managed and developed. The Fisheries Proclamation provides an excellent legal framework for fisheries management in the country and contains requirements for consultation with stakeholders in management decisions (including neighbouring states where migratory or straddling stocks are involved), the consideration of biological, economic and social issues in management decisions and provisions for fisheries management decisions to consider broader ecosystem issues and protection of endangered species.

The principles of fisheries management specified in the Fisheries Proclamation are required to be formalized and administered for each fishery through the preparation of management plans, which are required to be reviewed regularly.

The Fisheries Proclamation identifies the Ministry of Fisheries of Eritrea as the responsible agency for managing fisheries in the country. The Ministry is therefore responsible for management, research and development and enforcement activities. However, the Fisheries Proclamation allows for 'authorized officers' to be empowered from other public agencies, thus allowing the Eritrean Navy to be actively involved in

day to day enforcement activities. However, the Ministry of Fisheries retains ultimate legal responsibility for such activities.

The Fisheries Proclamation requires stakeholder consultation in management at two main levels. First, such consultation is required in the preparation of management plans. Secondly, the Fisheries Proclamation establishes a Fisheries Advisory Council with broad stakeholder representation (see Section II above). The role of the Fisheries Advisory Council is “to advise on the management and development of fisheries and discharge such responsibilities as are conferred on it under the Proclamation”.

Because the Fisheries Proclamation is relatively new, it has not yet been reviewed or revised.

STATUS OF THE FISHERIES

In the management and development of fisheries in Eritrea, the status of any fish stock is legally required to be considered in the preparation of management and development plans for that fishery. However, because of scarce financial and technical resources, comprehensive assessments of the main fish stocks are rare, with most studies having been undertaken in the 1960s-1980s. The last stock assessment survey of Eritrean waters was undertaken in 1996, in collaboration with French Government scientists¹. However, stocks are monitored through the collection of catch and fishing effort data and these data provide the main source for ongoing assessment of fish stocks in Eritrea².

In the 1950s to the 1970s, Eritrean fisheries production was significantly greater than at present and the artisanal fishing industry was very active. Catches of well over 25 000 tonnes per year were reported in 1954, prior to the withdrawal of Yemeni fishing units³ with over 80 percent of this production consisting of small coastal pelagics - sardines and anchovy - which were processed into fishmeal or sun-dried in Massawa for export to European and Far East markets⁴. Reported harvests were in the order of 19 600 tonnes for fishmeal, 1 250 tonnes for processed sharks, 150 tonnes for shells, and 1 300 tonnes for foodfishes. Fisheries in those early days were essentially oriented towards exports.

Production, around 21 000 tonnes in 1966, dropped to 14 000 tonnes in 1967. This was due not to any decline in the productivity of the fishing grounds but because of the closure of the Suez Canal and consequently of the major cheap fishmeal export route. Fish exports in 1966/1967 only amounted to some 5 700 tonnes of processed products. By 1972, growing internal warfare and subsequent instability provoked a further decrease in fishing activity and landings fell to 4 000 tonnes. This trend continued during the following years. Numerous fishing craft were destroyed and, without outlet for their production, local fishers increasingly turned to other activities or other countries. As a result, by the end of the 1970s, the fisheries had almost completely collapsed. According to various sources, total production only amounted to about 328 tonnes in 1980. With independence in 1993, the fisheries are being rebuilt and expanded to include an industrial fishing sector.

Despite the long time periods between comprehensive assessments, the estimates of Maximum Sustainable Yield (MSY) from the various studies⁵ are quite similar and

¹ Summary results reported to the author by Eritrean Ministry of Fisheries, October 2003.

² The fisheries catch/effort statistics programme has begun in 1996, with enumerators working at artisanal landing sites in Massawa and Assab, and observers aboard all the industrial trawlers that currently have licenses from the Government of Eritrea.

³ FAO, 1983. Fishery Country Profile: Ethiopia. Rome, FAO (FID/CP/ETH, Rev.1).

⁴ Aubray, R., 1975. The fisheries of Ethiopia: An economic study. Rome, FAO (mimeo).

⁵ These studies include the 1996 study by French and Eritrean scientists, Grofit (1971), Bellemans and Reynolds (1992), Guidicelli (1984) and Sanders and Morgan (1989).

TABLE 1
Characteristics of the major fisheries of Eritrea

Category of fishery	Fishery	Volume (est. in tonnes)	Value* US\$	% of Total volume caught	% of Total value caught	Covered by a management plan? (yes/no)	# of Participants (est.)	# of Vessels (est.)
Industrial	Demersal trawl	6 831	\$5.2 m	92.6%	68.4%	Yes	936	46
	Pelagic	210	Included in (1)	2.8%	Included in (1)	Yes	Included in (1)	Included in (1)
	Shrimp	337	\$2.4 m	4.6%	31.6%		Included in (1)	Included in (1)
Artisanal	Demersal & pelagic	1 928	\$3.8 m	94.2%	82.6%	Yes	3000	600
	Shrimp	119	\$0.8 m	5.8%	17.4%	Yes	Included in (1)	Included in (1)

* Estimated Value in 2002 US Dollars.

are used (together with ongoing monitoring) by the Ministry of Fisheries for planning fisheries development.

Small pelagic resources (mainly the sardine, *Harengula punctata*, and anchovy, *Thrissocles baleana* and *Amentum heterobolous*, comprise the majority of the estimated total MSY for fisheries resources at around 50 000 tonnes per year (Grofit, 1971). MSY for demersal resources, mainly, in order of greatest abundance, lizardfish (*Saurida* spp.), threadfin breams (*Nemipterus* spp.), barracuda (*Sphyraena* spp.), snappers (*Lutjanus* spp.), and groupers (*Epinephelus* spp.) have been estimated at around 15 000-20 000 tonnes per year while large pelagic (including tunas) MSYs have been estimated at around 7 000 tonnes per year. The remainder of the estimated total MSY consists of shrimp (500 tonnes per year), lobster and other minor species.

In total, the Maximum Sustainable Yield for all fisheries resources in Eritrea has been variously reported at around 80 000 tonnes per year. Current landings for all major species are significantly less than this and therefore fisheries' planning in Eritrea in recent years has concentrated on development activities to increase landings in a sustainable way.

A summary of the characteristics of the major industrial and artisanal fisheries in Eritrea in 2003 is as follows: there are only small recreational fisheries and no data are available although recreational fishers need to be licensed (Table 1).

MANAGEMENT ACTIVITY

The principles and goals of fisheries management are contained within the Fisheries Proclamation and in the management plans for the various fisheries. The Fisheries Proclamation also enumerates the types of management activities that are permitted. These are:

“Prescribed management measures may include but are not limited to:

- closed season and closed areas;
- prohibited fishing method and gear and specification of gear that may be used (including the mesh size of nets);
- the species, sizes and other characteristics of fish and other aquatic organisms that it is permitted or forbidden to catch; and
- schemes for the limitation of entry into all or any specified fisheries.

A regulation prescribing management measures may also prohibit the possession, purchase, sale, import or export of any gear, fish or other aquatic organism.”

All of these prescribed management measures are currently in use. Closed areas for trawling have been established around environmentally-sensitive coral reef islands, cod-end mesh sizes for demersal trawl nets have been set at 45 mm, entry to the industrial fishery is tightly controlled by limitations on the number of license issues, scoop nets are prohibited in waters less than 15 meters deep and various closed seasons are enforced.

In the industrial fishery, these management measures are enforced by on-board observers⁶ and inspections by the Eritrean Navy while local village and regional-level cooperatives are active in ensuring compliance with these management measures. It is reported⁷ that current compliance with management measures is very high although some illegal and unlicensed fishing apparently occurs in more isolated areas of the country.

Stakeholder participation in the development of fisheries policy and management measures is legislated within the Fisheries Proclamation and is extensively practiced. Collection of fisheries statistics from both the industrial and artisanal fleets was begun in 1996 and is well developed and provides the basic data for fisheries and stock monitoring. More comprehensive fisheries research is undertaken periodically, usually with assistance from aid agencies or through bilateral arrangements.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

With the fisheries development and management processes now being well developed and with fisheries expanding, the costs of fisheries management and associated activities (enforcement, research and monitoring) are increasing. The Ministry of Fisheries receives an annual budget from the Government for its activities each year with this budget having increased over the past five years.

Revenues from fisheries licensing and royalties from the industrial fleet constitute the main source of fisheries-related income to the Government. With the increase in industrial fishing, these revenues are increasing and, in 2003, were around US\$ three million per annum.

Although there is no formal link between the revenues received by the Government from fisheries royalties and licensing and the budget for the Ministry of Fisheries, in practice the Ministry's budget has increased more or less in line with the increased revenues.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Eritrea has not yet ratified the UN Convention on the Law of the Sea (UNCLOS) nor the UN Fish Stocks Agreement or the UN Compliance Agreement.

However, Eritrea is a signatory to CITES and also to the Convention on Biological Diversity and follows the FAO Code of Conduct for Responsible Fisheries in framing its national legislation and in preparing management plans for its fisheries.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird bycatch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Eritrea is a member of the Indian Ocean Tuna Commission and participates fully (as funding allows) in the committees and working groups of the Commission.

National legislation requires that regional fisheries issues are considered in making management decisions and in preparing management plans for highly migratory and straddling stocks.

SUMMARY AND CONCLUSIONS

Following the decline in landings in the late 1970s as a result of civil unrest in the country, Eritrea has moved significantly since independence in 1993 to redevelop and

⁶ Total staff devoted to monitoring, control and surveillance activities in Eritrea rose from three in 1993 to 56 in 1999, including at-sea observers (Ghebremariam and Ghebretensae, 2000). However, a comprehensive observer program covering all vessels is yet to be put in place.

⁷ Personal communication from Ministry of Fisheries, October 2003.

manage its fisheries resources. This development and management is being undertaken in an orderly way and takes into account current international norms and obligations, particularly those related to broader fisheries and marine ecosystem issues encapsulated within the concepts of ecological sustainable development.

The finalization of excellent national fisheries legislation in 1998 with the assistance of FAO (The Fisheries Proclamation) has been a major step forward to establishing a sound legal framework for the sustainable development of Eritrean fisheries. This legal framework is being supported by significant management action and close monitoring of fish stocks, most importantly through the preparation of detailed management plans for the industrial and artisanal fisheries. These management plans are prepared in close collaboration with all stakeholders and, as a result of this inclusiveness, respect for and adherence to fisheries regulations seems to be high.

As a result of this careful and orderly development of the fisheries sector, the landings from the marine fisheries of Eritrea have increased steadily over the past decade and only market development issues would seem to prevent further increases in the future. The industrial fishery has moved, in 2002, from one of permitting licensed foreign fishing in the EEZ to one where emerging Eritrean companies now are fully involved in industrial fishing activities, using chartered vessels. Importantly, these increasing landings (both from the industrial fishery and the artisanal fishery) and greater control by Eritrean industrial fishing companies has been accompanied by close monitoring of stocks and current information would indicate that most fish stocks are still significantly under-exploited and therefore further increases in sustainable landings can most likely be achieved.

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APPENDIX TABLES

Current management of marine capture fisheries in Eritrea

Level of management	% Fisheries managed	% with Fisheries management plan	% with published regulations*	Trends in the number of managed fisheries over ten yrs. (increasing/decreasing/unchanged)
National	75%	75%	95%	Increasing
Regional				
Local	95%	95%	95%	Increasing

Use of fishery management tools within the three largest fisheries in Eritrea

Category of fishery	Fishery	Restrictions				License/limited entry	Catch restrictions	Rights-based regulations	Taxes/royalties	Performance standards
		Spatial	Temporal	Gear	Size					
Industrial	Demersal trawl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	Pelagic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	Shrimp	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Artisanal	Demersal & pelagic	N	No	No	Yes	Yes	No	Yes	Yes	No
	Shrimp	No	No	No	Yes	Yes	No	Yes	Yes	No
Recreational	Only small recreational fisheries	No	No	No	No	Yes	No	No	No	No

Costs and funding sources of fisheries management within the three largest fisheries

Category of fishery	Fishery	Do management funding outlays cover			Are management funding sources from		
		R&D	Monitoring & enforcement	Daily management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Demersal trawl	No	Yes	Yes	No	Yes	No
	Pelagic	No	Yes	Yes	No	Yes	No
	Shrimp	No	Yes	Yes	No	Yes	No
Artisanal	Demersal & pelagic	No	Yes	Yes	No	Yes	No
	Shrimp	No	Yes	Yes	No	Yes	No
Recreational	Only small recreational fisheries	No	Yes	Yes	No	Yes	No

Compliance and enforcement within the three largest fisheries in Eritrea

Category of fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	Demersal trawl	No	Yes	Yes	Yes	Yes	
	Pelagic	No	Yes	Yes	Yes	Yes	
	Shrimp	No	Yes	Yes	Yes	Yes	
Artisanal	Demersal & pelagic	No	No	Yes	Yes	Yes	
	Shrimp	No	No	Yes	Yes	Yes	
Recreational	Only small recreational fisheries	No	No	Yes	Yes	Yes	

Capacity management within the three largest fisheries in Eritrea

Category of fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Demersal trawl	No	Yes	Constant	No	
	Pelagic	No	Yes	Constant	No	
	Shrimp	No	Yes	Constant	No	
Artisanal	Demersal & pelagic	No	Yes	Constant	No	
	Shrimp	No	Yes	Constant	No	
Recreational	Only small recreational fisheries	No	Yes	Constant	No	

Country review: India (West coast)

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September 2004

INTRODUCTION

The information in this review, which covers the west coast of India, has benefited from the prior manuscript of Flewwelling and Hosch (2006) of this report which presented information on fisheries management for the East Coast of India. Predictably, data on management and the legal framework at the national level is similar between the two areas and therefore such information has been sourced from their manuscript. Their excellent summary of these matters is gratefully acknowledged. Appropriate additions, deletions, explanations and other changes have been made to make national information relevant to west coast situations. Specific data on management and other arrangements on the west coast, including any errors, are my responsibility.

India is one of the largest countries in the world, with a combined coastline of 8 041 km in length, and an exclusive economic zone (EEZ) of 2.02 million km².¹ With a land area of 3.3 million km², India is referred to as a sub-continent in its own right. India borders Pakistan in the north-west, China in the north, Nepal, Bhutan, Bangladesh and Myanmar to the north-east. The Ganges drains a substantial part of India's northern states, and drains into the Bay of Bengal after passing Calcutta, not far from the border with Bangladesh.

The population was estimated to be 1.03 billion people in 2002 with 28 percent of the population living in urban centres. 29 percent of the people live under the national poverty line.² 360 million live in coastal areas, and 6.7 million are fishermen, including, full-time, part-time and occasional fishermen (Vivekanandan, 2002). About 2.4 million are employed full-time in marine capture fisheries (Flewwelling, 2000). Fishing communities generally rank amongst the poorest in India. Just over one third of full-time fishermen are located on India's east coast, while two thirds of fishermen and 70 percent of marine fish production originates from the west coast.

India's economy has shown good long-term growth, with an average growth rate of 5.6 percent for the decade leading up to 1992, and 6.1 percent during the decade to 2002. The structure of the economy has changed over the last 20 years, with the agriculture contribution to GDP (including fisheries) falling from over one third in 1982 to only one quarter in 2002, and the service sector growing from 37.2 percent in 1982, to 49.2 percent in 2002. Exports of marine products have quadrupled during the last 20 years, growing from US\$313 million in 1982 to US\$1.2 billion in 2002.³

There are marked oceanographic differences between east and west coasts of India, with the prolific monsoon-driven upwelling system being found along India's west coast.⁴ As a result of this upwelling and the generally greater primary production in west coast areas, fisheries production in this area dominates the national production, with approximately 70 percent of total landings being taken in the west coast states.

¹ Source: FAO Fisheries Country Profile; <http://www.fao.org/countryprofiles/>.

² Source: World Bank online database; www.worldbank.org/data/countrydata/countrydata.html.

³ Source: World Bank online database; www.worldbank.org/data/countrydata/countrydata.html.

⁴ Inshore areas (<50m depth) of the east coast only yield 66% of the fish per unit area (5.9 t/km²), when compared to west coast areas (8.8 t/km²).

The states of Kerala in the southwest and Gujarat in the northwest dominate landings with around 30 percent of west coast production originating in Kerala and 37 percent in Gujarat. The other west coast states of Maharashtra and Karnataka, in addition to offshore Islands contribute the remaining 33 percent of west coast production.

This level of production from India's west coast makes India by far the largest fish producer in the western Indian Ocean, contributing over 46 percent of total production from this area.

POLICY FRAMEWORK

India has adopted a policy of developing its own fisheries resources for local consumption, both in its offshore and inshore fisheries. As a result, and unlike most other developing countries, India has never signed a fisheries access agreement with a distant water fishing nation (DWFN), and has persisted for decades in its attempts to develop its own offshore industrial fisheries by nationally-owned interests. Despite proceeding with national development of its offshore fisheries, India's inshore fisheries have always been the most important sub-sector, both in terms of catch and numbers of people depending on the fisheries.

The primary national goal for fisheries is to increase per capita availability of fish from the current level of around 5 kg/year to around 11 kg/year. To achieve this, State and Government policy focuses on developing fisheries at all levels, with the aim to sustain or increase production and to guarantee continued growth of the sector. Modernization of the fleet and upgrading of infrastructure receives attention through subsidies, although amounts are modest and one-time payments. This production-oriented focus applies especially to the activities of the Ministry of Agriculture and related Departments responsible for capture fisheries, at both Union and State levels, with significant variations across States and Union territories.

India is one of the world leaders in terms of establishing associations and societies formed by fishing communities, workers, and other interests related to the sector. These organizations develop and defend positions, publish findings, and influence authorities on policy formulation and management options.⁵ Government encourages the formation of associations in all sectors (aquaculture, inland fisheries, mariculture, coastal fishing, offshore fishing, etc.) in order to put in place an enabling framework to engage in discussions with stakeholders, to receive realistic reports of field activities, constructive recommendations for strategy and policy formulation, and to receive feedback on government proposals.

Coastal Fishing Policy

Coastal Fishing⁶ Policy is defined by an open access regime, which has given rise to a sector with many entrants exploiting coastal marine resources to, and beyond, their

⁵ A selection of associations and societies across the whole of India, to show the diversity include: Indian Fisheries Association, Mumbai; Inland Fisheries Society of India, West Bengal; Society of Fisheries Technologists (India), Cochin; Marine Biological Association of India, Cochin. The Asian Fisheries Society, Indian Branch, Mangalore; Seafood exporters Association of India; Association of Indian Fishery Industries; All India Shrimp Hatcheries Association; Kerala Fishermen Welfare Fund; Confederation of Fish Farmer's Welfare Associations; National Fishworkers' Forum (to protect the interests of fishworkers and mechanized boat operators); etc.

⁶ India distinguishes between two types of marine capture fisheries, each one ruled by its particular legal regime. These are: a) coastal fisheries, and b) deep sea fisheries. Coastal fisheries fall under State jurisdiction, and take place within the first 12 nautical miles from the base line out to sea. Deep-sea fisheries are those operations taking place between 12 nautical miles and the outer boundary of the EEZ, falling under the jurisdiction of the Union Government. In practical terms, most coastal fishing operations take place in waters less than 50 meters in depth, and are carried out from small scale vessels, generally less than 20m LOA. Deep sea fishing is generally meant to indicate industrial operations, but in practical terms, some small-scale craft targeting particular resources are found to operate all the way to the outer boundaries of the EEZ.

full potential. The current legal framework provides for conflict minimization between traditional and industrial sub-sectors, with little emphasis on sustainable management of the resources.⁷ Conflict resolution at the village level through traditional village social mechanisms are also important factors in contributing to stakeholder involvement in fisheries management issues.

Both National and State Governments have initiated a range of schemes that aim to develop and modernize the traditional inshore sector. Modernization focuses on improvements to: a) types of fishing craft used, replacing old and heavy materials with newer, more durable and lighter ones, b) materials used in fishing gears, such as nets, and c) motorization and mechanization⁸ of the fleet.

Vivekanandan (2002) lists five separate, centrally-funded programmes to develop coastal marine fisheries. It must be noted though, that the scope of these programmes are subject to budget constraints, and may not necessarily represent significantly large programmes or programmes that are undertaken on a continuous basis. These programmes are:

- assistance to fishermen for the motorization of traditional craft (subsidies),
- introduction of plywood and intermediate craft,
- reimbursement of central excise duty on HSD oil⁹ used in mechanized vessels,
- assistance to maritime state governments to enforce fisheries regulations (providing patrol boats), and
- resource enhancement through creation of artificial reefs and subsidization of mariculture

In addition to this, Government supports the construction of major and minor fishing ports, bearing all the costs of major developments, and entering cost-sharing arrangements with State Governments for smaller projects. Welfare of coastal fishing communities is one of the objectives of fisheries development. Attention is also directed at the post-harvest sector through programmes to strengthen fish marketing infrastructure. This included facilitating the acquisition of cooling vans, cold storage, ice plants, bicycles, etc.¹⁰

Coastal Fishing Policy is thus production and export oriented and under the control of State Governments with support from the National/Union Government.

Deep Sea Fishing Policy

Deep Sea Fishing Policy is the responsibility of, and developed by the Union Government.¹¹ Since the declaration of its EEZ in 1976, the intent was for India to develop its own deep sea fishing capacity. This was attempted through a series of joint ventures that have not been particularly successful. Once again the focus of the deep-sea fisheries policy was increased production. The first deep-sea policy was announced by Government in 1977, providing for chartering arrangements with foreign operators. The 1981 Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act requires 60 percent of capital to be held by Indian citizens in joint venture companies, and an obligation to train Indian fishermen. A newer Deep Sea Fishing Policy was developed in 1986, and was revised again in 1991.¹² This policy was rescinded by the

⁷ See: Section 3, 4th paragraph.

⁸ Within the Indian context, “motorization” refers to out-board engine propulsion, replacing or adding to sails and oars of traditional craft, while “mechanization” refers to the operation of fishing crafts through inboard engines. In motorized craft, fishing operations are carried out manually.

⁹ High speed diesel oil used for fuel.

¹⁰ This particular programme is an initiative of the Marine Products Export Development Authority (MPEDA), functioning under the Ministry of Commerce and Industry.

¹¹ See: Section 3, 1st paragraph.

¹² This policy permitted up to 51% foreign share capital in fishing companies, inconsistent with the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981. (see also footnote 15).

Government in September 1996, under pressure of the National Fishworkers' Forum (NFF), highlighting serious conflicts between the domestic small-scale and industrial joint venture fleets.¹³

In late 2002, a new set of Guidelines for deep-sea fishing was announced by the Government. The focus now lies on the registration status of vessels, rather than mode of acquisition of vessels under charter arrangements and joint ventures – as the earlier policies did. In combination with new legislation on foreign investments, fishing companies with 100 percent foreign-owned capital can now register as Indian companies, register vessels and fly the Indian flag.^{14,15}

Under the new 21-point Guideline there are no obligations to land catch in India, to train Indian crews, and to pay license fees commensurate with the value of targeted catches. Therefore, potential benefits for the economy and fishing interests of India remain completely indistinguishable (Mathew, 2003). Further, the Guidelines do not represent India's new deep-sea fishing policy which has been under development since 1996.¹⁶ This policy is not yet effective, and awaits formal Government acceptance of the Gopakumar Committee Report. This means that by the end of 2003, the deep-sea fishing sector has been evolving in a policy vacuum for more than seven years.¹⁷

In summary, fisheries policies in India have been developed with few linkages between the sectors, based on dated and fragmented legislation at the National and State level, and has generally focused on increased production with little emphasis on conservation, sustainability or responsible fisheries management.

LEGAL FRAMEWORK

The various facets of marine capture fisheries and marine habitat fall under the responsibility of several agencies and Ministries, at both the Union Government and State levels. Items on List I (Union List) are dealt with by the Union Government, and items on List II are dealt with by State Governments. List III contains a list of items which fall under the shared responsibility of both the Union Government and the States (Concurrent List), and both the Indian Parliament and the State Legislatures have power to pass laws regarding these items. The Lists are enshrined in the *Constitution of India*. Table 1 provides a summary overview of core items related to marine capture fisheries, presenting the agencies/Ministries responsible for legislating and implementation.

There are no legal provisions in place below State level to legislate for fisheries management at the local level. As noted in Matthew (2003), the sharing system is the norm in India as opposed to wages, but the traditional sharing system in some parts of India is unique in that it can include all members of a fishing crew, whether or not they fish, widows of former crew members lost while fishing and even down to the village barber. This is a traditional management sharing system that is not common in other countries¹⁸.

¹³ A strike prompted the Government to constitute the Murari Committee in 1995, which recommended that the deep sea fishing policy of 1991 be called off.

¹⁴ The Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, in force since 1981, defines an Indian fishing vessel as any vessel, which is owned by a company in which not less than 60% share capital is held by citizens of India. This gives rise to an inconsistency in the legal substance ruling ownership and registration of fishing vessels owned by companies with more than 40% foreign share capital.

¹⁵ This enables a tuna fishing company from Taiwan to register as an Indian company, while also being registered as a fishing company in Taiwan. Its vessels can move between EEZs and fish for tuna by legally flying different flags (flag hopping).

¹⁶ In 1999, an expert group led by K. Gopakumar, then Deputy Director of Fisheries, Indian Council of Agricultural Research, was constituted to elaborate a comprehensive marine fisheries policy. The report was submitted to Government in late 2001.

¹⁷ See: Legal Framework Section.

¹⁸ This is applicable to the artisanal sector only; in the mechanized sector, the crew receives monthly wages, plus (sometimes) a share in the returns.

TABLE 1

Selection of items related to marine capture fisheries, and legislative competence

Item	Agency/Ministry/Department
• Deep Sea fishing (List I)	
• Survey & assessment of fisheries resources	Ministry of Agriculture /
• Research	Department of Animal Husbandry and Dairying
• Training & extension	
• Aquaculture development	
• Monitoring of fishing by foreign vessels (List I)	Ministry of Defence /
• Prevention of marine pollution by ships	Coast Guard
• Protection of endangered species (Wildlife Protection Act, 1972)	
• Fish processing	Ministry of Food Processing
• Processing units	
• Seafood exports (List I)	Ministry of Commerce & Industry /
• Quality control	Marine Products Export Development Authority (MPEDA)
	Export Inspection Council (EIC)
• Law of the Sea negotiations (List I)	Ministry of External Affairs
• Potential fishing zones	
• Monitoring ocean pollution	Department of Ocean Development (DoD)
• Fishing vessel industry (List I)	
• Major fishing ports (List I)	Ministry of Shipping
• Minor fishing ports (List II)	
• Aquaculture in territorial waters (List II)	State Government /
• Fisheries in territorial waters (List II)	Department of Fisheries
• Protection of marine biodiversity (List III)	
• Protection of coastal habitats (List III)	Ministry of Environment and Forests (MoEF)
• Focal point for Ramsar, CITES, CMS & CBD Conventions (List III)	

The current legal framework for fisheries hinges on a series of Acts that do not directly deal with, or simply fail to mention the sustainable management of fisheries resources proper. In actual fact, the only Indian legislation mentioning “undertaking measures for the conservation and management of offshore and deep-sea fisheries” is the Marine Products Export Development Authority Act of 1972 (Mathew, 2003).¹⁹ Although the Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act that followed in 1976 recognizes the sovereign rights to conservation and management of living resources in the Indian EEZ, in addition to their exploration and exploitation,²⁰ as well as providing the Central Government with the power to legislate for the conservation and management of the marine living resources within the EEZ,²¹ the ensuing Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act of 1981, and its regulations of 1982,²² fail to bring up conservation or management of fisheries resources altogether (Mathew, 2003).

Since maritime States are responsible for marine fisheries legislation within the territorial sea²³ (List II item; *see* Table 1), States proceeded to develop their own Maritime Fishing Regulation Acts and Regulations.²⁴ The driving force behind these

¹⁹ *See*: Marine Products Export Development Authority Act, 1972. Section 9 (2)(a).

²⁰ *See*: Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976. Section 7 (4) (a).

²¹ *See*: Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976. Section 15 (c).

²² Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Rules, 1982.

²³ In 1967, India proclaimed a territorial sea of 12 nautical miles instead of six, by Presidential Proclamation, revoking the previous proclamations of 1956 concerning the territorial sea and the contiguous zone.

²⁴ e.g. West Bengal Marine Fishing Regulation Act, 1993 – “An Act to regulate fishing by fishing vessels along the coast line of the State”. Karnataka Marine Fishing Regulation Rules, 1987 – implementing the provisions of the Karnataka Marine Fishing Regulations Act, 1986.

Acts was the rising number of serious conflicts between artisanal fishermen and trawlers. The ensuing Acts and Regulations focused principally on provisions enabling the regulating of fishing vessel operations and movements in the territorial sea, aiming at protecting traditional fishermen, and maintaining law and order. This legislation failed to provide for limited access, effective legal action against infringements, and inter-State vessel movements (Mathew, 2003).

As an example, the Kerala Marine Fishing Regulation Act provides powers for restricting the numbers of vessels, restricting operational areas, separating traditional fishermen from larger vessels by allocating specific fishing areas (inshore and offshore) for the two sectors and various other measures to address conflict resolution issues. It does not address the issue of sustainable management of fisheries. Some Acts also left fisheries officers with discretionary powers in granting fishing licenses for motorized vessel owners and assigning areas of operation.²⁵ Under this system of Union Acts, State Acts and Regulations, legislative frameworks for production have evolved, but the sustainable management of specific fisheries has not been developed.

The absence of such supporting fisheries management legislation leaves the executive arms of Ministries and Departments at Union and State levels in a considerable legal void, when it comes to the planning and implementing of responsible fisheries management activities.

Traditional social measures at the village level exist for consultation on fisheries issues, and the involvement of stakeholders in the management process. The importance of these traditional consultative mechanisms (which also extend to dispute resolution) have probably been under-estimated in an attempt to move towards a more centralized fisheries management arrangement at the national and State level. Co-management arrangements are being actively discussed (Kurien, 1999), and partly applied, even if not formally enshrined in the law.²⁶ It is also reported that more than 2/3 of fisheries are managed in some way. Input controls are part of legislation, but the effectiveness of implementation is subject to debate. Some of the more important fisheries that remain in need of management efforts include shark and sea cucumber fisheries.²⁷

In summary, both formal and traditional mechanisms for consultation and conflict resolution are in place; fisheries management is devolved to State control within territorial seas, and Union control outside territorial seas; legislation focuses on production, and sustainable fisheries management principles are not yet fully included in the fisheries laws.

STATUS OF THE FISHERIES

The west coast of India is by far the most important area so far as fisheries production is concerned, accounting for over 70 percent of national production. This is a result of both major upwelling areas in the southwest and productive, shallow-water demersal resources in the north-west.

²⁵ e.g. Goa, Daman and Diu Marine Fishing Regulation Rules.

Section 3. Application for licensing of fishing vessels under section 6. - (1) Every owner of a fishing vessel which is mechanically propelled shall make an application accompanied by a license fee of Rs. 205/- to the authorized officer, for the grant of a license for using such fishing vessel in the specified area in Form A. (2) The authorized officer shall, while granting or refusing the license, apart from the conditions specified in clause (a), (b) & (c) of sub-section (4) of section 6, have regard to the number of fishing vessels already licensed in the area where the fishing vessel is sought to be operated. (3) If the authorizing officer, after making such enquiries as deemed fit, decides to grant the license applied for, he shall issue the license in Form B, which shall be valid for a period of one year the date of issue. (4) The authorized officer, having regard to the area in which the fishing vessel is sought to be operated, may direct the applicant to deposit an amount which shall be no less than Rs. 210/- but not more than Rs. 250/- as security for the due observance of the conditions of the license.

²⁶ Source: Government of India.

²⁷ Ibid.

Gujarat State in the north-west has, for some years, been the major fish producer in India, and, in 2001, accounted for around 37 percent of west coast production and 26 percent of national production. Gujarat is closely followed by Kerala in the south-west which, in 2001, contributed around 30 percent of national production. The other west coast states of Maharashtra and Karnataka, in addition to offshore Islands contribute the remaining 33 percent of west coast production.

The Lakshadweep Islands, which extend into the Arabian Sea, and have a continental shelf of 4 340 km², have average annual landings of around 4 400 t. The island ecosystem is unique, with various species of tuna accounting for 70 percent of the landings.

The Kerala Coast in southwest India experiences significant upwelling during the southwest monsoon period (June to September), resulting in abundant phytoplankton and zooplankton. Consequently, the fisheries in this area are dominated by small pelagics (49.7 percent of total landings) such as sardines, whitebait and Indian mackerel. On the other hand, the Saurashtra coast in the northwest experiences winter cooling of oceanic waters during November-February with no significant upwelling and consequently the fisheries in this area are dominated by demersal species (57.2 percent of landings) such as sciaenids, flatfish, ribbonfish etc.

The fisheries of the west coast of India can be conveniently divided into both artisanal and industrial sectors as well as inshore (<50 meters) and offshore fisheries. Artisanal fisheries dominate the inshore areas while industrial fishing dominates the offshore area, usually operating under the provisions of the Deep Sea Fishing Policy²⁸.

Managing fisheries in accordance with sustainability guidelines is not required by legislation either at the State or National/Union level. As a result, many stocks both in the inshore and offshore area are either fully- or over-exploited although it is generally agreed that offshore areas are more lightly exploited and may, for some species, be under-exploited²⁹. Offshore species which are considered to have the greatest potential for increases in exploitation rates are various species of tuna, threadfin bream, carangids and deepwater shrimp (Vivekanandan, 2002). However, sustainability issues are often considered in framing fisheries regulations in the area. As an example, declining shrimp catches in Kerala in the 1980s resulted in various committees being established by the State Government to examine the problem (Kurup, 2001). The result was a ban on trawling throughout Kerala during the monsoon period each year; although the ban was partly a response to conflict resolution issues as larger vessels were increasingly fishing during the normally observed non-fishing season.

Marine pollution and coastal degradation has impacted on resources in the coastal areas (including estuaries)³⁰ and has degraded the marine resource potential and marine biodiversity of these areas. As a result, the issues of overexploitation of many coastal fisheries resources have been becoming more important, even in areas where the number of fishermen and vessels has remained stable. However, within the context of marine and coastal eco-system destruction in the Indian Ocean area, over-exploitation of fisheries resources and coastal habitat destruction is not as much a problem in India as it is in other countries of the region³¹.

Total fish production from the west coast area of India in 2001 was 1.996 million tonnes with this level of production having been maintained for some years. Table 2 provides data on the catches, by species group, for the period 1998-2001 for the west coast area of India in addition to similar data for 1980.

²⁸ Administered by the Union Government but sometimes with consultation with the coastal States.

²⁹ Ministry of Agriculture Report, New Delhi, 1991.

³⁰ NOAA International Coastal Management Country Profile, 2004.

³¹ NOAA International Coastal Management Country Profile, 2004. However, data is often lacking on the status of stocks or the impact of habitat destruction on commercial fisheries resources.

TABLE 2

Reported Fisheries landings (in metric tons) by Species for India's West Coast Fisheries, 1980 and 1998-2001

	1980	1998	1999	2000	2001
Anchovies, etc. nei	40 025	68 487	54 308	54 987	64 249
Barracudas nei	501	9 903	9 926	350	382
Bombay-duck	114 855	144 774	146 591	133 156	142 944
Brown seaweeds		16 000	16 000	16 000	16 000
Butterfishes, pomfrets nei	37 143	15 200	14 897	10 417	8 093
Carangids nei	4 336	21 426	22 589	5 679	5 909
Cephalopods nei	10 954	86 337	84 793	85 939	103 903
Clupeoids nei	14 442	70 487	63 435	36 678	32 823
Croakers, drums nei	93 643	233 160	280 556	235 744	214 665
False trevally	4 368	7 995	5 503	4 623	5 992
Flatfishes nei	9 178	17 460	12 840	24 709	11 271
Flyingfishes nei	31	57	102	114	47
Frigate and bullet tunas		6 152	12 722	13 101	7 031
Giant tiger prawn		167 904	168 942	145 857	136 443
Goatfishes	5 363	7 061	7 186	8 457	14 748
Green seaweeds		60 000	60 000	60 000	60 000
Hairtails, scabbardfishes nei	38 829	58 595	92 334	100 570	93 970
Halfbeaks nei	644	1 312	1 928	1 650	1 474
Indian mackerel	40 455	142 669	138 086	62 026	29 938
Indian oil sardine	157 881	110 288	122 254	277 842	287 628
Indo-Pacific king mackerel		13 965	12 003	13 150	43 112
Indo-Pacific sailfish				8	
Jacks, crevalles nei	7 622	52 315	51 741	22 808	31 418
Kawakawa		12 376	16 757	17 255	851
Kelee shad	7 138	3 077	3 076	3 896	6 458
Lizardfishes nei	9 329	12 012	11 539	4 029	2 671
Longtail tuna		3 805	2 275	2 342	258
Marine crabs nei		369	394	6 193	8 009
Marine crustaceans nei	11 070	12 658	11 272	11 047	8 853
Marine fishes nei	108 463	264 758	288 658	293 193	335 781
Marine molluscs nei		2 718	1 217	815	547
Marlins, sailfishes, etc. nei		1 557	1 188	1 303	407
Mulletts nei	2 585	5 760	6 104	6 799	6 004
Narrow-barred Spanish mackerel		19 921	17 123	18 759	27 650
Natantian decapods nei	209 003	97 570	90 957	90 734	86 882
Percoids nei	19 800	52 230	53 600	58 297	40 053
Pike-congers nei	17 198	5 820	5 414	5 236	4 831
Pompanos nei		2 533	2 329	12	11
Ponyfishes (=Slipmouths) nei	8 878	9 115	8 934	4 551	6 951
Red seaweeds		24 000	24 000	24 000	24 000
Sea catfishes nei	36 147	36 082	38 432	31 467	45 850
Sea squirts nei				95	
Seerfishes nei	19 391				
Sharks, rays, skates, etc. nei	26 810	33 418	34 088	37 060	34 036
Skipjack tuna		831	5 707	5 878	21 789
Streaked seerfish		67	58	64	
Threadfins, tasselfishes nei	1 958	1 544	2 780	2 243	2 817
Tuna-like fishes nei	18 884	4 931			
Unicorn cod	897	1 113	458	1 123	2 095
Wahoo		14	12	13	
Wolf-herrings nei	10 539	10 201	4 663	6 813	10 038
Yellowfin tuna		2 772	1 547	1 596	7 324
TOTAL	1 088 360	1 932 799	2 011 318	1 948 678	1 996 206

nei = not elsewhere included

Source: (FAO 2003)

Table 2 highlights several issues, both with the reliability of production statistics in measuring landings in India and also with changes in the species composition of landings over time.

First, most fisheries statistics in India are collected at landing places although species that are destined for export are recorded at the point of sale or export. Hence aquaculture production is sometimes incorporated into landings statistics, particularly for those species that are exported. In addition, consumption at home, which may be significant, is often not included in statistics collection. As a result, the production statistics outlined in Table 2 should be treated with some caution. Therefore, a significant part of the increase in reported landings for the west coast of India between 1980 and the late 1990s was a large increase in the landings of giant tiger prawn (*Penaeus monodon*). This species actually comprises a very small proportion of wild capture landings³² although culture of *P. monodon* has increased significantly in the area in the past two decades. Therefore, it is likely that the reported 'landings' are actually aquaculture production.

Despite these problems, some trends are apparent in that most marine species have shown a general increase in landings, particularly cephalopods and 'other marine fish'. This is no doubt a reflection of the growing importance of offshore fisheries. By contrast, natantian decapods (mainly lobster) have declined significantly. However, overall, landings have shown strong growth, almost doubling in the 21 years between 1980 and 2001.

The reason for this increase in production is almost exclusively an increase in fishing effort, both in inshore areas and offshore. For example, coastal fisheries in Kerala have witnessed an increase in fishing effort between from 5 230 mechanized vessels in 1977 to 17 102 by 2001 (Kurup, 2001). In addition, 27 899 non-motorized vessels operated within the 60 m depth zone in 2001. Similarly, in Gujarat, the fishing fleet has increased to 29 506 vessels in 2002, 19 092 of which are mechanized³³.

Most fisheries production from the west coast of India is derived from the mechanized sector³⁴ with 95 percent of landings coming from this sector in Kerala in 2001 (Kurup, 2001). The contribution from the traditional, non-motorized or non-mechanized sector is rapidly declining and, in 2001, represented less than five percent of the total landings in Kerala.

Methods of exploitation of marine fisheries resources vary from simple traps to large trawlers and from handlines to modern purse-seiners. There are also regional variation in fishing vessels and gear. Traditional catamarans, common on the east coast are not used on the west coast to any great extent, with dugout canoes being the more common traditional fishing craft.

Mechanized vessels include stern and outrigger trawlers, gillnetters, purse-seiners, longliners and dol-netters (bag nets, mainly for Bombay duck) whereas traditional non-mechanized craft use handlines, gillnets and fish traps. There is a program in place to upgrade dugout canoes in the area by the addition of small outboard motors and, since 1977, 50 922 motors have been fitted to these traditional craft (Vivekanandan, 2002)

The three largest fisheries on the west coast of India (Table 2) are Indian Oil sardine, Bombay duck and shrimp or prawn fisheries. The characteristics of these fisheries are shown in Table 3.

The Indian Oil sardine (*Sardinella longipes*) fishery occurs both on the west coast and east coast of India although it is concentrated in large shoals along the south west coast of Kerala and Mysore. Fishing begins on the 0+ age group (100-140 mm) early in

³² India Agronet – prawn fisheries. (2004). www.indiaagronet.com.

³³ Fisheries Department, Government of Gujarat 2003. <http://fisheries.gujarat.gov.in>.

³⁴ This includes all vessels with motors.

TABLE 3

Characteristics of the three largest, marine fisheries (by volume) of India's West Coast in 2001

Category of Fishery	Fishery	Volume (Est. in tonnes)	Value* USD	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan?	# of Participants (Est.)	# of Vessels (Est.)
Artisanal/ Commercial ⁽¹⁾	Sardine	287 628	431 m	14.5	12.7	No	49 000	4 200 ⁽²⁾
	BD	142 944	172 m	7.2	5.1	No	13 500	1 700
	Prawn	136 433	1.36 b	6.9	40.1	No	45 000	8 200

Note: Fisheries are the Indian Oil Sardine (Sardine), Bombay Duck (BD) and the prawn, or shrimp, fisheries (prawn).

* Estimated Value in 2002 U.S. Dollars.

1. The largest fisheries on the west coast are combined artisanal and commercial/industrial fisheries.

2. Includes approximately 280 purse seiners. Beach seines, operated from shore are not included in the estimated number of vessels but are included in the estimated number of participants.

the season (July-August) and is concentrated on this group throughout the rest of the year. 1+ fish (150-170 mm) taken later in the season (January-February) also contribute significantly to the overall catch whereas 2+ fish only comprise a minor part of the catch.

The fishery, which in 2001 landed 288 000 t from the west coast (Table 2) is a mixed artisanal/industrial fishery and utilizes dugout canoes (Kerala coast), out-rigger vessels (Maharashtra and Karnataka coasts) and purse seiners (offshore areas) to take the fish. However, the bulk of the catch is taken in shallow waters between the shoreline and 15 meters depth. Gillnets (both drift and set nets) and shore seines in addition to a variety of small and large vessel seine nets are the most commonly used gears with the shore seine being an important part of the artisanal fishery. Mesh sizes currently in use for seine nets for Indian oil sardine range between 14 mm and 66 mm although mesh sizes are not regulated.

Most of the catch is locally consumed as fresh product although canning, freezing, drying, and production of sardine oil is also undertaken.

The fishery fluctuates significantly from year to year in response to oceanic conditions and particularly the abundance of phytoplankton blooms (*Fragillaria oceanica*, *Coscinodiscus* spp and *Pleurosigma* spp). There also appears to be an inverse relationship between the abundance of the Indian oil sardine and Indian mackerel *Rastelliger kanagurta*, the basis of which is not yet fully understood.

Because the fishery appears to be driven more by oceanic conditions and the abundance of plankton blooms (which are, in turn, a result of the extent of upwelling on the south west coast), there has been little concern expressed as to the status of the stocks despite rising fishing effort levels. This is supported to some extent by landings which, although showing wide year-to-year fluctuations, have not trended downwards as fishing effort has increased.

The fishery for Bombay Duck (*Harpodon nehereus*) contributes around ten percent of the average national landings and, in 2001, 143 000 t were landed in the west coast States (Table 2). The species has a wide, and discontinuous, distribution along both east and west coasts of India although the north west coastal States of Gujarat and Maharashtra contribute the greatest catches. Given the discontinuous distribution, a priority for management and research has been to determine whether the east and west coasts stocks are separate or consist of a single stock³⁵.

Fishing methods used to take Bombay duck vary between regions. In Saurashtra, about 400-500 vessels operate 'dol' nets in coastal waters 6-12 miles offshore whereas in Gujarat the majority of the catch is taken by gillnets (30 ft long with a mesh size of 1 inch) operated in inshore coastal waters between June and September. Most of the catch is sun-dried although a small quantity is sold fresh or is 'laminated' by pressing and drying.

³⁵ India Agro Net – Bombay duck fishery. <http://www.indiaagronet.com>

The status of the stock(s) of Bombay duck is uncertain, although landings on the west coast seem to have stabilized at around 140 000 t, a slight increase on the landings in 1980 (Table 2). Spawning and recruitment appear more or less continuous on the west coast, although peaking during the monsoon period between September and December.

The prawn, or shrimp, fisheries of the west coast of India target a large number of both penaeid and non-penaeid species. In Kerala in the south west and along the west coast, *Penaeus indicus*, *P. monodon*, *Metapenaeus dobsoni*, *M. monoceros*, *M. affinis*, *Parapenaeopsis stylifera*, *P. sculptillis* and *P. hardwickii* are the major contributors to the catch with the species mix being dependent both on location and on the seasonal monsoons in coastal waters. Following the monsoon period (from November onwards), landings of *M. dobsoni*, *M. monoceros*, *M. affinis*, *P. stylifera*, *P. sculptillis* and *P. hardwickii* tend to be the main components of the catch whereas *P. indicus* and *P. monodon* are found throughout the year, particularly in the backwaters and estuary fisheries. As noted above, *P. monodon* is only a minor proportion of the total landings (probably less than one percent³⁶), despite the official landings statistics.

Non-penaeid prawn fisheries dominate the more northern areas of the west coast with Gujarat and Maharashtra States accounting for the bulk of the annual landings of around 125 000 t in 2001³⁷. *Acetes* spp account for 74 percent of the landings; while *Nematopalaemon tenuipes* account for a further 25 percent. *Exhippolysmata ensirostris* made up the remainder of the landings. These landings have shown a steady increase from about 1961, rising from approximately 20 000 t per annum at that time to 80-100 000 t per annum during the 1990s to the current levels of around 120 000 t.

Most prawn fisheries on the west coast are subject to exploitation throughout their lifecycle, with large, traditional fisheries for juveniles occurring in the backwaters and estuaries of Kerala and other States and both traditional and large mechanized trawl fisheries for adults in offshore waters.

Fisheries in the backwaters and estuaries tend to be undertaken throughout the year whereas the marine coastal fishery is seasonal with a regulated, variable closed season during the monsoon period (Kurup, 2001).

Assessments of the stocks of the major species comprising the prawn fisheries of the west coast have been undertaken periodically with the general conclusion that stocks generally are over-exploited with fishing capacity being too high and prawns being taken at sub-optimal sizes, mainly as a result of the fishery for juveniles in the backwaters. However, the small prawns that are taken in the backwater fisheries provide much of the local supply of prawns to the market since the larger sizes (often taken by offshore trawling) are increasingly being packed and exported. Kurup (2001) showed the beneficial effect on landings and catch rates of the closed season for trawling that was introduced in 1988.

MANAGEMENT ACTIVITY

Management of inshore fisheries on the west coast of India is the responsibility of State Governments, usually operating through State Fisheries Departments and with specific State-based legislation. Offshore fisheries management is the responsibility of the national or Union Government³⁸. As a result, management activity varies both between States and between offshore and coastal jurisdictions. However, as noted above, the primary focus of management activity in all cases is not so much the sustainable management of resources but the development of the fishing industry and conflict

³⁶ India Agro Net – Prawn fisheries. <http://www.indiaagrironet.com>.

³⁷ Central Fisheries Research Institute. Internal research report (2002) on Assessment of Non-Penaeid Shrimp Resources of the North West Coast of India.

³⁸ See Policy Framework section above.

resolution between competing user groups. As a result of this focus, management activity and enforcement of regulations is not well developed, given the size of the fisheries involved.

The Ministry of Environment and Forests, which also functions as the national focal point for a number of multilateral environmental agreements (MEAs) such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 (CITES) and the Convention on Biological Diversity, 1992 (CBD), is gradually introducing measures for the protection and management of marine resources (Mathew, 2003).³⁹ This stands in contrast with the production and growth oriented policies pursued by the Ministry of Agriculture, other Union ministries and State departments and agencies dealing directly with fisheries. This clearly symbolizes a step forward in terms of legislating for the sustainable management of fisheries resources.

As an example of the focus of State fisheries legislation, and in an effort to develop fisheries in coastal area of Gujarat, the State Government implemented the new Gujarat Fisheries Act in 2003. Under the Act, registration of vessels has been made compulsory, as has registration of ancillary industries such as boat building, processing plants, ice factories etc. However, the Act still does not explicitly address the key issues of sustainable management of the resources.

Perhaps the most important specific management activity related to sustaining fisheries on the west coast was the introduction, in 1988, of a variable closed season for trawling. Kurup (2001) showed that enforcement of this compulsory trawling ban of between 22 and 70 days during the monsoon period in Kerala has had a beneficial effect on both total trawl landings and catch rates. In addition, the trawl ban has resulted in an increase in average sizes of most captured species, including *Parapenaeopsis styliifera* and *Metapenaeus dobsoni*.

A number of management measures aimed at sustainable fisheries are, however, under discussion. For example, in an effort to overcome the problems of declining coastal productivity and declining marine biodiversity in coastal areas as a result of coastal environmental degradation and marine pollution, it is planned to develop technologies and implement pilot projects to increase the productivity of India's coastal areas selectively, mainly by sea ranching and mariculture⁴⁰.

Measures have also been taken to introduce resource-specific fishing vessels for deep-sea oceanic fisheries and, in addition, the concept of no-fishing zones in open waters is gaining importance in several regions of the west coast of India (Vivekanandan, 2002).

National fisheries institutions often support the activities of coastal management authorities. For example, the Fisheries Survey of India (FSI) has been operating for years, and is responsible for mapping and assessing the extent of fish stocks. However, activities are troubled by budget limitations. The Central Marine Fisheries Research Institute (CMFRI), Kochi, is among a number of Institutes tasked with fisheries research. The CMFRI is tasked with collection and analysis of national catch and landing data.⁴¹ These are all linked to the Ministry of Agriculture and the Indian Council of Agricultural Research, New Delhi.

In terms of enforcement, it is to be noted that dockside and landing site inspections are carried out by fisheries officers. Neither a VMS system nor an on-board observer scheme is in use⁴². The enforcement activity is not portrayed as being stringent enough

³⁹ In 2001, ten species of shark and ray and nine species of mollusks, all sea horses, giant grouper, five species each of coral and sea cucumbers, sponges and mollusks, have been brought under the ambit of the Indian Wildlife Protection Act of 1972.

⁴⁰ NOAA International Coastal Management Country Profile, 2004.

⁴¹ url: http://www.cmfri.com/cmfri_frad.html.

⁴² FAO has assisted India in monitoring, control and surveillance issues through the Fishcode project, including the identification of MCS requirements (FAO, 2000).

to provide a strong deterrent effect, or to guarantee reasonable compliance of the various sectors with the fisheries law. Enforcement at sea is split into two sectors. The State Police is tasked with law enforcement of the territorial sea, using its own set of patrol boats, while the Indian Coast Guard⁴³ is tasked with patrolling of the EEZ. The agencies responsible for penalty attribution are the respective Departments of Fisheries. Penalties include fines and the revoking of fishing licenses. Fines and the risk of getting caught are generally found too low to represent an appropriate deterrent level to bring about compliance.⁴⁴ Central Government states that offences have decreased over the past decade.⁴⁵

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The overall national budget for fisheries management has decreased over the last ten years, both at the Union and the State level. Costs related to Monitoring, Control and Surveillance (MCS) and conflict management are said to have increased although no specific data are available. The Government generally believes that the financial resources directed at MCS as adequate.

Participation by operators in the fisheries to cost-sharing for fisheries management is minimal. License fees are levied in the mechanized sector, but fees are low, as are penalties applied for fisheries offences. These sources of revenue do not represent a serious contribution to the overall cost the Government faces for the management of the resource.

Fishermen cooperative societies are exempted from income tax. Perhaps, the most important reasons for this exemption are the following:

- farmers are exempted from income tax, and fishing activities that are considered similar to farming operations are also exempted;
- costs of collecting taxes in a highly disaggregated sector like the Indian fisheries sector may not justify the revenue that could potentially be collected.

Seafood exporters were exempted from income tax until recently. Exports (all agricultural commodities exported, including seafood) are charged a fee of 0.3 percent of the FOB value of seafood exports, having been reduced from 0.5 percent initially. The collected tax is used for financing the Marine Products Export Development Authority (MPEDA), and currently stands at about US\$ 4 million *per annum*. Import tariffs on seafood were 60 percent until recently; but these were reduced to 30-35 percent in 2002-03.⁴⁶ India imports very little fish, unlike other countries in the region.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

India signed the UN Convention on the Law of the Sea (UNCLOS) in 1995 and ratified the Convention in 1996. It has also ratified the UN Fish Stocks Agreement in 2003 but has yet to ratify the UN Compliance Agreement.

India takes an active interest in and participates fully in global fisheries initiatives at a policy level, including taking up some of the challenges represented by a host of International Programmes of Action (IPOAs) that have been launched by FAO over the past few years. A Coordinated Project for the Conservation and Management of Coastal and Marine Biodiversity was launched in 1999-2000, as well as a coral reef monitoring programme.

⁴³ The Indian Coast Guard was established through the Coast Guard Act of 1978 (Act No. 30 of 1978), and operates under the Ministry of Defense. It is also responsible for the protection of marine habitat from ship-based pollution and the protection of species under the Wildlife Protection Act (e.g. turtle protection measures). The Indian Coast Guard is one of the few organizations in any Asian country that requires all junior officers to attend a six week fisheries training course as part of their formal training).

⁴⁴ Source: Government of India.

⁴⁵ Source: Government of India.

⁴⁶ Source: Sebastian Mathew, personal communication to Hosch and Flewwelling, December 2003.

While by-catch of seabirds is perceived as a minor problem in Indian fisheries, ten species of endangered shark have come under the ambit of the Indian Wildlife Protection Act of 1972, and research programs are being directed at this particular resource.⁴⁷ A sub-group has been constituted to assess fishing capacity, and the Government intends to have capacity measured by 2005. In addition to this, the new deep-sea policy is mentioned in the capacity study, and is expected to address these issues.

The extent of IUU fishing and related problems is also being assessed by a sub-group, and FAO is currently conducting a study into IUU fishing in India. The sub-group will suggest a set of appropriate measures to be taken upon publication of FAO's findings. The dual registration and flag hopping for foreign vessels registered under Indian companies is an issue that will need to be addressed.

However, despite these advances in policy development, issues such as the Code of Conduct for Responsible Fisheries have not been incorporated into national or State fisheries legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

India is party to a number of regional bodies, programmes and projects dealing with fisheries management and the protection of coastal habitats, communities and resources. Included in these are APFIC and IOTC. India collects data in formalized data collection schemes, and regularly feeds back due data to these regional bodies.

India also participates in programmes, inter-governmental and regional organizations that also deal with the management and conservation of fisheries resources, or the trade of fisheries products. These include the following:

- Bangladesh-India-Myanmar-Sri Lanka-Thailand Economic Cooperation (BIMST-EC)
- Bay of Bengal Large Marine Ecosystem (BOBLME)
- Bay of Bengal – Inter-Governmental Organisation (BOBP-IGO)
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Indian Ocean Rim Association for Regional Cooperation (IOR-ARC)
- The South Asian Association for Regional Cooperation (SAARC)

There is, however, no legal requirement within either State or national fisheries legislation for fisheries management issues that may be adopted by regional fisheries bodies (or other regional body) to be incorporated into national legislation.

SUMMARY AND CONCLUSIONS

Marine fisheries on the west coast of India contribute around 70 percent of India's national landings and are by far the largest fisheries in the western Indian Ocean region. However, marine capture fisheries contribute less than half of the national fish production (48.7 percent in 2000), the remainder coming from inland fisheries, inland aquaculture and brackish water aquaculture. Shrimp currently represents the single largest foreign currency earner as an export commodity.

Despite the size of these fisheries, however, management remains focussed on development goals and conflict resolution with resource sustainability being of secondary concern within State and national legislation. There are no limitations on entry to any fishery and the fisheries are essentially open-access. As a result, many fish resources in inshore areas of the west coast are over- or fully-exploited although some fisheries in the less-fished offshore areas are considered to be under-exploited.

In excess of 90 percent of the catches are taken from coastal waters, including backwaters and estuaries. The sector is modernizing, but traditional small-scale craft,

⁴⁷ Source: Government of India.

part of which are motorized and/or mechanized, remain responsible for the bulk of catches. Overall, bottom trawling operations of vessels less than 16 m LOA account for around 50 percent of all catches.

Offshore fishing, or deep-sea fishing, is still very much under-utilized in India, and the lack of a coherent policy on deep-sea fishing appears to be a key factor. It is thought that another 0.7 million tonnes of untapped resources could be harvested from India's EEZ, outside the territorial waters. The present contribution of deep-sea industrial-scale vessels to the overall catch is very small.

Employment, increased per-capita production, welfare of fishermen and increased export earnings are the main aims pursued by Government through its recent five year plans. Efforts aimed at fisheries focus on infrastructure enhancements (ports and post harvest facilities) and modernization of the fleet, affected through a range of direct investments and subsidy schemes. In comparative terms, much less effort is aimed at appraisal, management and conservation of the resources *per se*.

The responsibility for management of fisheries is shared between a number of Union and State organizations with day-to-day management mainly being implemented by State Fisheries Departments. No single Ministry is solely responsible for managing the fisheries sector. This lack of an overarching and coherent policy addressing coastal and deep-sea capture fisheries contributes to the lack of a coherent organization of the sector as a whole. There is a clear need to provide a mandate for one single Ministry to organize and administer the sector as a whole, supported by appropriate changes in the legal framework under which fisheries are managed.

However, India does have a well-developed Fishermen's Cooperative tradition and this may represent an important management tool for maritime States and Government for the future. It enables the authorities to address access to marine resources and management issues through the empowerment of well-organized communities. Effective input controls, community-based property rights and co-management schemes are potential ways forward to solve the problems of overcapitalization and excessive fishing pressure in coastal waters.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of managed fisheries over the last ten years
National (Union)	>67	<33	>67	increasing
Regional (State)	>67	<33	>67	increasing

Use of Fishery Management Tools within the three largest fisheries

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Commercial	generic	Yes	Yes	Yes	Yes	Yes*	No	No	No	No
Artisanal	generic	Yes	Yes	No	No	No	No	No	No	No

* Most maritime States have provided for licenses for motorised vessels in their Acts. This encompasses the possibility to limit entry for given areas for such vessels.

Costs and Funding Sources of Fisheries Management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Commercial	generic	Yes	Yes	Yes	Yes	No	Yes*
Artisanal	generic	Yes	Yes	Yes	No	No	No

* Roughly 0.5% is levied on value for export products

Compliance and enforcement within the three largest fisheries

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Commercial	generic	No	No	Yes	Yes	No	
Artisanal	generic	No	No	No	Yes	No	

Capacity management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Commercial	Included in artisanal	Yes		decreasing	No	
Artisanal	Indian Oil sardine	Yes	India plans to have fleet capacity measured by 2005	decreasing		
	Bombay Duck	Yes		decreasing		
	Shrimp	Yes		decreasing		

Country review: Iran (Islamic Republic of)

Gary Morgan

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August 2004*

INTRODUCTION

Iran has major fisheries in both the Caspian Sea and the Persian Gulf and Gulf of Oman and is the largest fishery producer in the region. With an annual production from all areas in recent years in excess of 400 000 tonnes, Iran is also one of the world's major fish producers. Of this production, approximately 324 000 tonnes in 2002 was derived from the fishing areas of the Persian Gulf, Gulf of Oman and the Caspian Sea.

With fisheries extending over two major sea areas, the marine areas of Iran range from the extreme meteorological and hydrological conditions of the Persian and Oman Gulfs, where summer water temperatures reach over 35° C to the colder conditions of the Caspian Sea. As a result, the fisheries of Iran are diverse and include major demersal and pelagic resources in the Gulf areas to the major clupeid fisheries and the valuable sturgeon fishery of the Caspian Sea.

Most fisheries in Iran are undertaken by a combination of large vessels and smaller, artisanal vessels with, for example, the fisheries of the Persian Gulf area consisting of 66 steel trawlers, 2 835 wooden vessels (or dhows) and 6 793 out-board-powered small boats. There is very limited recreational fishing activity (mainly from boats) although this is growing in popularity, particularly in the resort islands area of the southern Persian Gulf.

The management of fisheries in Iran has been characterized (unlike other countries in the region) by a more well-developed partnership between the Government and the private sector with all fishing activities being undertaken by the private sector, apart from the important sturgeon fishery in the Caspian Sea. The private sector also has input into fisheries investment and management processes, which legislatively are under the control of Iran Fisheries Company (Shilat).

In recent years, Iran has needed to address some major fish stock issues. Among these are declining demersal (and some pelagic) resources in the Persian Gulf, environmental degradation and an invasion of the Caspian Sea by an exotic comb jelly which has reduced the large clupeid fisheries in the area and overfishing of the important sturgeon fishery. However, the Government of Iran sees potential for further development in the large, but untapped mesopelagic resources in the Gulf of Oman and is planning investment in fishmeal plants in southern Iran to utilize these resources.

POLICY FRAMEWORK

The national, or federal, authority with responsibility for fisheries management is the Iranian Fisheries Company (or 'Shilat'). This Company is managed by a vice-minister as the general director and head of the board of directors. The company is supervised by a general assembly, whose members are: the Minister of Jihad-e-Sazandagi as the head of the assembly, the Minister of Agriculture, the Minister of the Interior, the Minister of Economic Affairs and Finance, the Head of Planning and Budget Organization and the Executive Deputy of the President. This assembly usually holds its session biannually.

Shilat has a number of affiliated companies, each responsible for various aspects of fisheries management, development and training. These include the Shilat Trading Company (which has exclusive rights to the sturgeon fishery), the Industrial Fishing Company, the Kilka Industry Company and the Iranian Research and Training Company.

With the passage of the new Fisheries Law in 1993¹, the policy framework for Iranian fisheries management and development moved towards greater private sector involvement in fishing activities and encouragement of private sector investment in fisheries infrastructure. The new Law also separates Shilat from enforcement and prosecution responsibilities and gives Shilat the power to suspend licenses, obtain compensation for damage to a fishery and call for the suspension of polluters damaging a fishery. These powers give Shilat the support that was previously lacking to carry out its principal role as manager and conservator of the resources. With the revision of the mandates of Shilat under the National fisheries law, fisheries law enforcement has been made the responsibility of a new coastguard agency, and its prosecution is the responsibility of the Ministry of the Interior.

Overcapacity has been recognized as a major issue in many Iranian fisheries and the Government has taken decisive steps to reduce such capacity in its most important fisheries. The government recently launched a “buy-back scheme” for vessels engaged in bottom trawl fishing that has led to a substantial reduction² in the number of large trawlers operating in this fishery. In addition to these measures, a limitation in fishing period for shrimp has been introduced, allowing only one month a year of fishing operation in the Persian Gulf.

A buy-back scheme has also been introduced in the Caspian Sea with the aim of eliminating gillnet fishing operations by the private sector, identified as destructive of the resources, especially sturgeon.

Almost all fishermen are members of fishing cooperatives and most provinces have one or two Cooperative Unions. Fish farmers also have their own cooperatives and Unions. There is one “Union of Fish Exporters” in the country, which deals with fish trade in domestic and international markets.

Local Provincial Governments undertake administration of fisheries-related infrastructure, such as the important local fish landing sites and fish markets.

International fisheries issues are the responsibility of the Shilat. However, regional co-operation is weak, both on a bilateral basis and through mechanisms such as the regional fisheries commission, RECOFI. Although Iran is a signatory (in 1982) to the UN Convention on the Law of the Sea (UNCLOS), it has not yet ratified UNCLOS. Iran ratified the UN Fish Stock Agreement in 1998 but has not yet ratified the FAO Compliance Agreement.

LEGAL FRAMEWORK

Iran has had a legal framework for fisheries management for some time³ and has updated this legislation on a regular basis. In 1993, the earlier fisheries legislation of *Law of Protection and Exploitation of the Fisheries Resources* (1974), and the *Law Related to Punishment Applicable to the Over-exploitation of the Fishery Resources in the Persian Gulf and the Caspian Sea* (1979) was replaced by a comprehensive Fisheries Law. This new Fisheries Law defines the role of the national management authority

¹ The fisheries law was implemented in 1995, prior to which there was no comprehensive fisheries legislation but, rather, specific laws addressing issues such as penalties for illegal fishing in Gulf waters, the setting up of the Shilat Fishing company's Constitution etc.

² The number of vessels was reduced from 68 to 20, with the buy-back being wholly funded by the Government.

³ However, this legal framework was not comprehensive but consisted of a number of laws that addressed specific fisheries issues, often within identified regions such as the Gulf.

(Shilat) and provides Shilat with the powers for comprehensive fisheries development and management.

There is also a large body of national, provincial and local legislation that impacts on fisheries management, including Article 50 of *Constitution of Islamic Republic of Iran* which declares protection of the marine environment a public obligation and therefore 'economic and any other activity, which results in pollution or irremediable destruction of the environment is prohibited'. Other major relevant legislation that impacts on fisheries management issues includes:

Environmental Protection and Enhancement Act (1974)

Law of Protection of the Sea and Internal Water Bodies against the Oil and Oil-products Pollution (1975)

Law of Proper Use of Water Resources (1982)

Law of Environmental Protection against Water Pollution (1984)

Law Applicable to Any Economical, Cultural, Societal Development (1989)

Law of Environmental Protection and Development (1991)

Law of Protection against Natural Environmental Damages (1991)

The practical result of this range of overlapping legislation is that action on important resource or fisheries management issues is often difficult to implement. Further revisions of the national fisheries law is in progress which is attempting to address this problem.

STATUS OF THE FISHERIES

The fisheries of Iran are significant and comprise two distinct geographic sectors: the Caspian Sea fisheries (the 'northern' fisheries) and the fisheries of the Persian Gulf and Gulf of Oman (the 'southern' fisheries). In both areas, the fisheries are a mixture of large-scale industrial production and artisanal, small-scale fisheries. The national legislation encourages private sector investment in large-scale, industrial fishing enterprises.

(a) The Northern Fisheries

Iran shares its Caspian Sea stocks with other countries that border this inland Sea and therefore regional fisheries and environmental issues can, and do, impact on stock status. The principal fisheries in the Caspian Sea are the fisheries for sturgeon (*Acipenser* spp.) and for 'kilka', a three species mixture of clupeid. Fishing in the Caspian Sea of Iran is carried out by six steel vessels, 151 wooden vessels (dhows) and about 860 out-board-powered small boats. Beach seine fishermen are organized in 141 working groups. Three types of fishing gear are used in Caspian Sea, namely: beach seine (local name *pareh*) for bony fish along the coastline; lift net (conical net with light attraction) for kilka and gillnet for sturgeon. Fishing for sturgeon is now restricted to the state owned company due to conservation concerns. The fishing fleet in the southern Caspian area of Iran has been significantly reduced in recent years through a Government 'buy-back' scheme aimed at eliminating the use of gillnetting by the private sector fisheries.

Production from the Iranian part of the Caspian Sea consists mainly of sturgeon, kilka, and a group of bony fishes including 'white fish' (*Rutilus frisii*), mullets, carp, pike-perch, breams and herrings and a few other species. The catch of sturgeon resources is controlled exclusively by the Fisheries Research Organization in collaboration with the Deputy for Fishing and Ports Affairs. Kilka resources have been exploited totally by the private sector, operating motorized vessels equipped with conical nets and light attractors. In 1999, the total catch in the Caspian Sea reached 110 000 tonnes, including sturgeon (1 000 tonnes), kilka (95 000 tonnes) and bony fish (14 000 tonnes) although catches have since declined and, in 2001 were around 40 000 tonnes.

Several major fish stock and environmental issues are impacting fish production in the Caspian Sea. In 1998, the exotic ctenophore (*Mnemiopsis* spp.) was accidentally introduced into the Caspian Sea from the Black Sea, where it had been a major

environmental problem for some years. The impact of *Mnemiopsis* on the ecosystem of the Caspian Sea is already very significant. Preliminary results from monitoring programs set up in Azerbaijan and Iran clearly show that zooplankton seems to be the worst affected component of the ecosystem in the Caspian Sea. The impact of the decline in abundance of zooplankton has been reflected in major declines in small pelagic fish abundance. Kilka landings in particular being reduced by around 50 percent in two years. Water level fluctuations in the Caspian Sea (partly a result of damming of inflowing rivers) have also impacted significantly on fish production.

Apart from these major environmental issues, there is also significant illegal fishing in the Caspian Sea generally that has led to stock declines, particularly for the important sturgeon fishery. In 1989, Iran relaunched its caviar trade, shut down since 1979 because of religious concerns and in 1996, five Former Soviet Union (FSU) Caspian Sea countries signed an agreement to ban all sturgeon fishing in the Caspian Sea except in the deep channels of the Volga delta, with equal fishing rights for all of the FSU countries. However, rampant poaching in the Volga delta and Caspian Sea by Kazakhstan and Azerbaijan, and the tacit involvement of the Russian government in 1997 led buyers more often to seek Iranian caviar. This trade is partly driven by the poor quality of some of the poached product, but more importantly by the strict controls by Shilat of the entire Iranian production and distribution through reputable dealers. Further, Iran also processes and distributes Turkmenistan caviar, because that country lacks production facilities. Although restocking of sturgeon takes place throughout the Caspian Sea (including from the Iranian research facility at Sari, in the Caspian Sea province of Mazandaran) the rate of restocking is declining as a result of financial constraints.

In 1995 Shilat exported 146 mt of caviar from a total Caspian Sea production of 182 mt. In addition, Iran also exports the legal production of Turkmenistan which has no production facilities of its own. Iran has established a target of 250 mt of caviar for the year 2020.

All sturgeon species in the Caspian Sea are listed as endangered by the Sturgeon Specialist Group of the International Union for the Conservation of Nature (IUCN).

Although the sturgeon fishery is the highest profile fishery in the Caspian Sea, the kilka fishery is larger and employs more people. Iran has developed export products based on fish protein concentrate (FPC) targeted at a Far East market in Japan and China. However, the current *Mnemiopsis*⁴ invasion and the consequent serious decline in this fishery has resulted in development plans for this fishery now being uncertain.

(b) The Southern fisheries

Industrial and semi-industrial fishing fleets carry out almost all fisheries in the Persian Gulf and the Oman Sea. The main fishing gears used in Iran include shrimp trawls, gill-net, wire traps (local name: gargoor), longline and beach seine, angling, and some other traditional forms such as set nets and set barrier nets. Many boats use a combination of fishing gear. In 1999, there were 66 steel trawlers, 2 835 wooden vessels and 6 793 out-board-powered small boats fishing commercially⁵.

Many demersal fish stocks in the Gulf and the Gulf of Oman are most likely shared with neighbouring countries and therefore actions in those countries will have impacts in Iran and throughout the species range.

Demersal fish stocks have declined over the past five - ten years in the Gulf, as they have in neighbouring countries. This has resulted in a decline in Iranian landings from

⁴ A comb-jelly that was apparently introduced accidentally to the Caspian Sea from the Black Sea in the late 1990s.

⁵ However, Taghavi (1999) reports slightly different figures of 80 industrial trawlers, 6 463 small boats and 2 732 dhows.

TABLE 1
Characteristics of the major fisheries of Iran

Category of fishery	Fishery	Volume tonnes	Value* US\$	% of total volume caught	% of total value caught	Covered by a management plan?	# of participants	# of vessels
Industrial	Kilka	45 180	\$20.3 m	13.4%	7.2%	No	1 908	814
	Demersal	95 000	\$104.5m	28.2%	30.1%	No	19 031	5 770
	Pelagic	116 000	\$148.8m	34.5%	36.9%	No	12 700	3 850

* Value in 2002 US Dollars.

the area from around 147 000 tonnes in 1996 to 95 000 tonnes in 2001. It has been speculated that this general decline in demersal fish stocks in the region is related to nursery habitat destruction as large scale reclamation and coastal development projects are carried out in the various countries.

In contrast, landings of large pelagic species have increased in the southern fisheries of Iran, from around 68 000 tonnes in 1996 to 116 000 tonnes in 2001. This increase in landings is mainly due to fishing effort increases.

Iran is planning to develop its extensive mesopelagic resources and has committed to building several fish meal plants in southern Iran which will rely on these resources (which are abundant in deep water in the Gulf of Oman) for the supply of raw material⁶.

The largest fisheries of Iran are shown in Table 1. There are no recreational fisheries of note and no management regulations applies to recreational fisheries:

Fisheries are the kilka fishery of the Caspian Sea (kilka), the demersal fishery of the Persian Gulf and Gulf of Oman (demersal) and the large pelagic fishery of the Gulf of Oman (pelagic).

MANAGEMENT ACTIVITY

Iran has continued to refine its fisheries management arrangements although the various layers of legislation at national, provincial and local level make progress difficult. Iran has recognized the importance of fishing over-capacity in many of its fisheries and has implemented programs to address this issue. This has included Government funded buy-back programs in both the trawl fishery of the Persian Gulf and the gillnet fishery of the Caspian Sea⁷. In addition, there is a general freeze on the issue of new commercial vessel licenses (along with other management measures) although this restriction does not, as yet, apply to the artisanal fishery.

Gear restrictions for commercial fishing are used, with trawl fishing banned in all areas (apart from shrimp trawling in the Persian Gulf) and a general ban on private sector gillnets in the Caspian Sea. This latter measure was introduced to protect juvenile sturgeon.

All Irani management practices rely on input controls and no fishery is managed by output controls, such as catch quotas. Closed areas, which are often marine protected areas, are an important component of fisheries management measures in Iran. In addition, there are closed seasons for various fisheries.

The enforcement of management measures is carried out by the Coast Guard and, for offshore fisheries, the navy. VMS is also used on all demersal trawl vessels to assist in enforcement of fisheries regulations. However, the effectiveness of enforcement activities is generally limited by a number of factors, including inadequate resources,

⁶ The existence of large stocks of mesopelagic resources in the Gulf of Oman has been known since the FAO surveys of the late 1970s. However, attempts by Oman and Iran to exploit these have not been successful, mainly due to the difficulties of handling and processing and the lack of a market for the product. However, Iran has developed specialized trawlers to exploit these resources and is intending to supply fish meal plants along the coast of the Gulf of Oman and the Gulf. However, the economics of the operation remain questionable.

⁷ The buy-back in the Persian Gulf reduced the number of demersal trawlers from 68 to 20.

little fisheries-specific training for Coast Guard staff and the lack of a strategic approach to enforcement activities, including no use of intelligence gathering. As a result, illegal fishing is common, particularly for the more valuable species such as sturgeon. The effectiveness of enforcement measures, however, is improving as the country addresses these issues.

No formal management plans exist for any fishery although most fisheries are subject to some form of management arrangements. In the absence of management plans, however, these management arrangements are not implemented within a strategic context and management objectives often remain unclear.

All industrial scale fisheries are largely a joint-venture arrangement between the Government and the private sector, which invests in these large-scale fishing enterprises. Artisanal fisheries are more subject to local jurisdiction although Shilat develops national fisheries management policies.

The monitoring, control and surveillance activities in Iranian fisheries have been documented as part of the FAO Fishcode program (FAO, 2000). These MCS activities include a comprehensive logbook program and enumerators for catch and fishing effort monitoring⁸, and collection of economic and social data.

All vessels are required to be licensed with these licenses stipulating the areas in which fishing operations are permitted⁹ and the gear type allowed.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No separate data is maintained within Iran's fisheries authority on the costs that are directly attributable to fisheries management issues. However, over the past ten years, budgets for fisheries management has certainly increased as Shilat addresses a greater range of fisheries and fisheries management issues. Fisheries development costs are generally sourced from the private sector who may also contribute, as part of the general arrangement, to fisheries management and monitoring costs.

Compliance is undertaken both by the Coast Guard, the various subsidiaries of Shilat and the Navy. Again, no separate accounting of compliance and enforcement costs is maintained. At-sea enforcement by the Coast Guard is also not accounted separately since fisheries-related issues are generally attended to during regular sea patrols for other purposes. However, it is generally agreed that the costs of fisheries management and compliance have increased significantly over the past five years.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Although Iran is a signatory (in 1982) to the UN Convention on the Law of the Sea (UNCLOS), it has not yet ratified this Convention. Iran ratified the UN Fish Stocks Agreement in 1998 although it has not, as yet, ratified the UN Compliance Agreement.

Iran has already incorporated many of the provisions of initiatives such as the Code of Conduct for Responsible Fisheries into its legislation and it is expected that other global fisheries initiatives will be incorporated when the legislation is next reviewed.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird bycatch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

⁸ This is undertaken by the Iranian Department of Fisheries Management. However, the Resource Protection Division of the Department of Fishing and Fishing harbours is responsible for using the monitoring data for planning, policy development and regulatory purposes.

⁹ This includes a provision for industrial trawlers to be restricted to offshore areas in the Gulf of Oman, at least 7 nm from the coast. Demersal trawling by industrial vessels is prohibited within the Persian Gulf although trawling by artisanal dhows and other small vessels is permitted.

PARTICIPATION IN REGIONAL FISHERY BODIES

Iran is an active member of the Regional Commission on Fisheries (RECOFI) and participates in most of the meetings and working groups of the Commission. However, RECOFI is yet to agree on the development of regional fisheries management initiatives and, therefore, there is no management coordination for stocks that cross the boundaries between Iran and its neighbours.

As a result, there have been no regional fisheries management initiatives emanating from RECOFI. Iran, therefore, has not been required to incorporate regional fisheries management issues into its national legislation.

There is, however, no legal requirement within the Iranian fisheries legislation for fisheries management issues that may be adopted by RECOFI (or other regional body) to be incorporated into national legislation.

SUMMARY AND CONCLUSIONS

Iran has developed its fisheries management regime as one that works closely with the private sector for the development of fisheries while maintaining management control with the central Government through the Iran Fisheries Company (Shilat) and its various subsidiaries. However, the many layers of legislation that impacts on fisheries at the national, provincial and local level makes progress towards a national fisheries policy difficult.

Iran has also been pro-active in developing the supporting infrastructure for effective fisheries management, particularly its research and training capabilities.

Despite this commitment to sustainable management of its fisheries, Iran is facing a number of major issues related to the management of its fisheries. Environmental issues in the Caspian Sea have resulted in serious declines in the abundance of the major kilka fishery. In addition, these environmental issues, combined with illegal fishing in Iran (and more so in neighbouring countries) have also resulted in serious declines in the valuable sturgeon fishery.

In the southern fisheries, demersal resources have declined in recent years, as they have in other countries of the region. However, pelagic landings have increased and Iran is moving to develop the large mesopelagic resources of the Gulf of Oman.

Fish landings in Iran have been maintained in recent years by developing new fisheries as others decline. This is not a strategy that can be pursued indefinitely. As a result, Iran will need in the future to address the legislative issues that hampers effective fisheries management in the country and to further pursue regional solutions to some of the more pressing marine environmental and fish stock issues.

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APPENDIX TABLES

Note: 'Commercial' Fisheries are regarded as non subsistence fisheries. Although there are small boat commercial fisheries in Iran (and these are often called 'artisanal' fisheries) these are included as commercial in the following tables.

Current management of marine capture fisheries

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations*	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	33 – 67%	nil.	33 – 67%	Increasing
Regional	n.a.	n.a.	n.a.	n.a.
Local	n.a.	n.a.	n.a.	n.a.

* In other cases of managed fisheries where no regulations have been published, licenses with conditions/rules are issued to participants under the Fisheries Act
n.a: not available

Summary information for three largest fisheries (by volume)

Category of Fishery	Fishery	Volume mt tons	Value* mil USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan? (Yes/No)	# of Participants	# of Vessels
Commercial	Kilka	45180	\$ 20.3 m	13.4 %	7.2%	No	1 908	814
	Demersal	95 000	\$ 104.5 m	28.2%	30.1%	No	19 031	5 770
	Pelagic	116 000	\$ 148.8 m	34.5%	36.9%	No	12 700	3 850
Artisanal	Included in above	n.a.	n.a.	n.a.	n.a.	No.	n.a.	n.a.
Recreational	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

* Value in 2002 U.S. Dollars.

** % values caught and % volume caught are based on totals for each category of fishery.

n.a: not available

Use of fishery management tools within the three largest fisheries

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Commercial	Kilka	Yes	No	Yes	No	Yes	No	No	No	No
	Demersal	Yes	Yes	Yes	Yes	Yes	No	No	No	No
	Pelagic	Yes	No	Yes	Yes	No	No	No	No	No
Artisanal	Included in above	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Recreational	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

n.a: not available

Costs and funding sources of fisheries management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Commercial	Kilka	No	Yes	No	No	No	No
	Demersal	No	Yes	No	No	No	No
	Pelagic	No	Yes	Yes	No	No	No
Artisanal	Included in above	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Recreational	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

n.a: not available

Compliance and enforcement within the three largest fisheries

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Commercial	Kilka	No	No	Yes	Yes	No	No
	Demersal	Yes	Yes	Yes	Yes	No	No
	Pelagic	Yes	Yes	Yes	Yes	No	No
Artisanal	Included in above	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Recreational	n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

* May be required to take observer on board. There is no observer programme.

n.a: not available

Capacity management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Commercial	Kilka	Yes	Yes	Constant or decreasing	Yes	Reducing or eliminating overfishing Increasing the profits of the boats remaining in the fishery
	Demersal	Yes	Yes	Constant or decreasing	Yes	Reducing or eliminating overfishing Increasing the profit of the boats remaining in the fishery
	Pelagic	Yes	Yes	Constant or decreasing	Yes	n.a.
Artisanal	Included in above	n.a.	n.a.	n.a.	n.a.	n.a.
Recreational	n.a	n.a.	n.a.	n.a.	n.a.	n.a.

n.a: not available

Country review: Iraq

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August, 2004

INTRODUCTION

Iraq has only a small coastline to the marine areas of the Gulf that separates the Arabian Peninsula and Iran and, as a result, its marine fisheries (which have always been a minor component of total fisheries production, being overshadowed by freshwater fish production and freshwater aquaculture) have traditionally been concentrated in the northwestern part of that Gulf. Since 1991, Iraq's marine fisheries have undergone major changes as a result of, first, UN sanctions imposed following Iraq's invasion of Kuwait in 1990, and secondly, as a result of the forced change of Government in Iraq in 2003.

These two major events have impacted marine fisheries and marine fisheries management in Iraq in a number of ways. Immediately following the withdrawal of Iraqi troops from Kuwait in 1991 and the subsequent imposition of UN sanctions, the marine areas of the northern Gulf could not be fished. Unexploded ordinance (including sea mines) and naval patrols by non-Iraqi forces essentially closed the fishing areas around Bubiyan and Warba Islands and the Shatt al-Arab waterway to any type of commercial fishing activity. As a result, marine fisheries production from Iraq dropped from around 4000-5000 tonnes prior to 1991 to essentially zero in 1991 and 1992.

As marine areas in the northern Gulf became safer for navigation and fishing, marine fisheries production from Iraq increased to pre-invasion levels by 1994/95. However, the budget and infrastructure resources available to the fisheries management agency (Ministry of Agriculture, through the General Authority for Animal Resources Development, Fisheries Department) for fisheries management and development declined rapidly after 1991, partly as a result of UN economic sanctions. This reduction in effectiveness of the fisheries management authority resulted in a decline in monitoring, management and enforcement activities for marine fisheries during the 1990s.

During the 1990s, marine fishing therefore became essentially unregulated and production increased rapidly to over 13 000 tonnes by the late 1990s. Precise statistics on production during this time are, however, not available since the ability of the fisheries management agency to collect, analyze and disseminate accurate production statistics also declined.

In addition to increasing unregulated fishing, marine fisheries production was also impacted to a significant extent in the mid-late 1990s by the major environmental issues of reduced flow of the Tigris and Euphrates Rivers (a result of damming on the upper reaches of these rivers) and the draining of the marshes in the Shatt al-Arab delta. Marine production probably declined as a result of these two factors (particularly for species such as shad, *Tenuolosa* spp.) although precise statistics are not available.

Since the change of Government in Iraq in 2003, Iraqi fishermen have been expanding their fishing activities southwards, particularly along the east coast of Bubiyan and Warba Islands and also appear to be operating illegally in the waters of Kuwait and, at a lesser extent, the Islamic Republic of Iran. This expansion of fishing activity is totally unregulated and involves both trawling activities in Khor Abdullah by steel-hulled

dhows and a significant amount of gillnetting activity in both Khor Abdullah and Khor Sabiyah, between the coast of Kuwait and the east coast of Bubiyan Island. Although there is a Kuwaiti Coast Guard station in the area, they have not to date curtailed the activities of these vessels.

As a result of this expansion in fishing activity, it is believed that both fishing effort and landings of marine fish species into Iraq (mainly Basrah and Umm Qasr) have increased significantly during the latter part of 2003 and 2004 with landings having probably returned to the high values of 12 000-13 000 tonnes seen in the late 1990s. Again, no detailed data are available.

All marine fisheries in Iraq are artisanal in nature with no large-scale industrial fisheries currently being undertaken. Most trawling activities are undertaken by traditional dhows, operating small, single nets. Gillnetting for pomphret (*Pampus* spp), shad (*Tenuolosa* spp) and mullet (*Liza* spp) is a major activity and is the dominant marine fishery in Iraq. Not surprisingly, there are no recreational marine fisheries in Iraq.

Iraq is currently facing a number of major challenges to bring its marine fisheries under control again. The infrastructure of the fisheries management authority needs rebuilding so that monitoring and management measures can be developed, implemented and enforced. In particular, enforcement issues need urgent attention. Marine habitat changes (particularly a result of the draining of the Iraqi marshes and reduction in freshwater inflow from the Tigris and Euphrates rivers) have become a major area of concern.

Most importantly, because Iraq's marine fisheries are small and the stocks upon which they rely are shared with other countries of the region, regional co-operation in fisheries management is essential for Iraq, as well as for other countries in the region. The Regional Fisheries Commission (RECOFI) provides the vehicle for such co-operation and can provide valuable assistance in future management initiatives for the stocks upon which Iraq's marine fisheries depend.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Iraq is the Ministry of Agriculture, through the General Authority for Animal Resources Development, Fisheries Department. This General Authority was established in 1989. Before that the General Authority for Fish Resources Development was responsible for marine fisheries management.

In the 18 provinces of Iraq there are sections (divisions) for fish resources that are part of the Ministry of Agriculture and these operate through the local agriculture authority in each province. The most important of these for marine fisheries is the local authority in Basrah Province.

Following the change of Government in 2003, it is unclear whether this structure will be retained.

There are currently no management plans in place for any of Iraq's fisheries and, apart from an un-enforced regulation specifying mesh sizes in gillnets, the marine fisheries are essentially unmanaged.

As a result, fisheries policy has tended to be *ad hoc* and the few management measures that have been introduced have been done so to address short-term, specific problems. Previous policy directions for marine fisheries in Iraq have concentrated on development issues, rather than management. In particular, the previous Government identified the encouragement of private-sector investment in marine fisheries as a major policy objective.

Subsidized services (such as engine and net repair etc) to the marine fishing industry have traditionally been a feature of the Iraqi Government's fisheries activities and such subsidies continued to a limited extent after 1991. However, as items such as parts for

repairing motors and netting materials became scarce as a result of UN sanctions, these subsidized activities necessarily declined.

The Marine Sciences Centre of Basrah University has undertaken some research that supported marine fisheries-related development and management initiatives. However, since 1991, the MSC has also suffered from a lack of infrastructure, financial resources, equipment and other resources to undertake effective research. The research undertaken by the MSC was often undertaken with the co-operation of the Basrah Fisherman's Co-operative, to which the majority of marine fishers in Iraq belong. In addition, the MSC had undertaken, prior to 1991, joint research on marine fish stocks with the Kuwait Institute for Scientific Research.

International fisheries issues are also the responsibility of the General Authority of the Ministry of Agriculture. However, Iraq has not participated in the activities of the Regional Fisheries Commission (RECOFI) and regional co-operation is weak or virtually non-existent, both on a bilateral basis and through RECOFI. Iraq ratified the UN Convention on the Law of the Sea (UNCLOS) in 1985 but has not ratified the UN Fish Stocks Agreement or the FAO Compliance Agreement.

LEGAL FRAMEWORK

The Fisheries Department of the General Authority for Animal Resources Development administers the basic national fisheries legislation, which is the Law no. 48 for 1976 on the regulation and development of fisheries. The Ministry of Agriculture, through the General Authority, issues regulations under this Law, according to need. The flavor of the Law is very much concerned with fisheries administration and overall policy objectives of fisheries management are not explicitly stated within this basic Law.

Although this basic fisheries Law has not been formally updated since 1976, it is, in effect, periodically updated through the mechanism of issuing additional Regulations as needed to address specific issues.

Iraq ratified UNCLOS at an early date (1985) and its territorial seas are defined through the UNCLOS process with marine boundaries having been established with all neighboring States.

Local legislation regulating coastal development and the operation of fisheries infrastructure, such as ports, markets, landing sites etc, also impacts significantly on fisheries management legislation.

STATUS OF THE FISHERIES

Adequate statistics on marine fisheries production in Iraq have not been collected for some years, with the statistics collection system slowly deteriorating throughout the 1990s. In addition, no assessment of the stocks of any of the main marine species has been undertaken during the past 15 years. Despite this, it is known that marine fisheries production virtually ceased during 1991 and 1992 as a result of the dangers of navigating in the northern Gulf at that time. However, from 1993, landings slowly returned to pre-1991 levels of 5 000-6 000 tonnes. As the management authority's ability to adequately manage marine fisheries declined during the 1990s, unregulated fishing expanded rapidly, resulting in landings increasing to around 11 000-12 000 tonnes by the late 1990s. Environmental issues, including the reduction in freshwater flow from the Tigris and Euphrates rivers and the draining of the marshes in southern Iraq, also apparently impacted on fish resources and landings in the late 1990s. However, since species composition of landings is not available, the precise impacts of these environmental changes cannot be estimated.

Following the change of Government in 2003, fisheries production from marine areas has expanded rapidly during the latter part of 2003 and 2004. This expansion has been totally unregulated and has apparently included significant illegal fishing in Kuwait waters and, to a lesser extent, the waters of the Islamic Republic of Iran.

TABLE 1
Characteristics of the major fisheries of Iraq

Category of Fishery	Fishery	Volume (Est. in tons)	Value* USD	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan?	# of Participants (Est.)	# of Vessels (Est.)
Artisanal	Trawl	1 500	\$3.5m	23%	18.9%	No	600	50
	Gill	5 000	\$15 m	77%	81.1%	No	2 000	350

* Estimated Value in 2002 U.S. Dollars.

As a result of these changes, and despite the lack of any formal assessment of the stocks of marine fish taken by the Iraqi fleet, it is probable that a number of key species are being over-exploited in recent years as unregulated fishing expands. In particular, the pomphret (*Pampus* spp) and the shad (*Tenuolosa* spp), both valuable species in Iraq, would appear to be under threat from small mesh gillnets. These stocks are certainly shared with the neighboring countries of Kuwait and the Islamic Republic of Iran and hence any increased exploitation of these stocks by the Iraqi fleet may impact the landings by these other countries.

With the recent southwards expansion of unregulated (and often illegal) trawling in 2003 and 2004, significant catches of shrimp (particularly *Metapenaeus affinis*) are now being taken, often from northern Kuwait waters. Since these stocks are shared with Kuwait and the Islamic Republic of Iran, this unregulated fishing may impact on the landings from these countries.

Other species, such as mullet (*Liza* spp) are not as localized to the northwestern part of the Gulf as other major commercial species and therefore are probably not under as a great a threat from over-exploitation.

The characteristics of the largest marine fisheries in Iraq, all of which are artisanal in nature, are shown in Table 1.

The major issue of changing marine environmental conditions in the northern Gulf may, however, overshadow the effects of increased unregulated fishing. Unfortunately, neither data on the impacts of those changing conditions on the marine environment nor data on the changes in species composition of commercial landings are available to assess the relative importance of these factors.

MANAGEMENT ACTIVITY

There are no stated national objectives or goals regarding management of any of Iraq's marine fisheries and no management plans exist for any of the country's fisheries.

In addition, management activities (through the issuing of Regulations pursuant to the basic Fisheries Law) have been minimal for Iraq's marine fisheries. A licensing system is in place although the issue of fishing licenses is unrestricted. A 50 mm mesh size regulation is also in place for marine gillnets.

However, the effectiveness of enforcement of these few regulations is minimal and has deteriorated further during the 1990s to the point where they are now widely ignored.

Stakeholder participation in the development of fisheries policy and management measures is through traditional discussions, often directly with the local senior representative of the Ministry of Agriculture. In this regard, the Basrah Fishermen's Cooperative is an important body that represents the interests of a significant proportion of marine fishermen.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No separate data is maintained within the Iraqi General Authority for Animal Resources Development on the costs that are directly attributable to fisheries management issues. However, since 1991, budgets for fisheries management have decreased dramatically, significantly impacting the ability of the General Authority to deliver fisheries management services.

In addition, the costs of subsidized services to the fishing industry has also declined since 1991, a result of the lack of items (partly as a result of UN sanctions) such as engine parts and netting material to provide these services¹.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Iraq ratified the UN Convention on the Law of the Sea (UNCLOS) in 1985 but has not ratified the UN Fish Stocks Agreement or the UN Compliance Agreement.

Issues such as the Code of Conduct for Responsible Fisheries have not been incorporated into national legislation.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Iraq has not participated in the Regional Commission on Fisheries (RECOFI) and has not participated in most of the meetings and working groups of the Commission. This lack of participation has been partly a result of the lack of funds to attend the RECOFI meetings. However, there is no real commitment to regional fisheries management by members of RECOFI and, as a result, the Commission is singularly ineffective in developing and implementing regional fisheries management initiatives.

As a result of this ineffectiveness of RECOFI, there have been no regional fisheries management initiatives emanating from RECOFI. Iraq, therefore, has not been required to incorporate regional fisheries management issues into its national legislation.

There is, however, no legal requirement within the Iraqi fisheries legislation for fisheries management issues that may be adopted by RECOFI (or other regional body) to be incorporated into national legislation.

SUMMARY AND CONCLUSIONS

Since 1991, the management of marine fisheries in Iraq has declined significantly in effectiveness, to the point where, currently, (2004) marine fisheries are totally unregulated. This has resulted in significant increases in fishing effort since 2003, with a corresponding increase in landings, although precise statistics are not available.

Moreover, this unregulated fishing has moved southwards, particularly into the northern waters of Kuwait and is therefore posing a threat to the marine fish stocks that Iraq share with Kuwait. Enforcement of the basic fisheries regulations by Iraqi authorities has declined during the 1990s to virtually zero while Kuwait authorities have been reticent to act against illegal fishing in their waters by Iraqi fishermen. Rapidly escalating trawl-fishing activities in Khor Abdullah and in northern Kuwait waters has resulted in Iraqi vessels now taking and landing significant quantities of shrimp, a species that has not previously been landed in Iraq in large numbers.

It is clear that this unregulated fishing needs to be brought under control quickly if further declines of the shared fish and shrimp stocks of the northern Gulf are to be avoided.

Added to this problem of escalating unregulated fishing is the environmental problems of reduced inflow of freshwater from the Tigris and Euphrates rivers and the draining of the marshes in southern Iraq². These two major impacts are influencing

¹ Since the change of Government in 2003, there has been a dramatic improvement in the availability of goods in Iraq, including fishing nets and other equipment, engine parts etc. This appears to have fuelled the increase in fishing activity during 2003, including illegal fishing.

² Following the handing over of sovereignty to a new Iraqi Government in mid-2004, the rehabilitation of the marshes is being addressed with the assistance of international organisations, including the UN Environmental Programme (UNEP).

the hydrographic environment of the northern Gulf (and further south) although the precise impacts on species composition and abundance of commercial fisheries are as yet uncertain. These environmental issues may take longer to address than the issue of unregulated fishing.

Even if Iraq is able to bring its fisheries under better management, the apparent shared nature of many stocks with other countries in the region and the weakness of the regional fisheries management commission, RECOFI, may limit the effectiveness of such national action in fisheries management.

APPENDIX TABLES

Current management of marine capture fisheries in Iraq

Level of management	% fisheries managed ¹	% with fisheries management plan	% with published regulations	Trends in the number of managed fisheries over ten yrs. (increasing/decreasing/unchanged)
National	0%	0%	0%	Decreasing
Regional	n/a	0%	0%	n/a
Local	n/a	0%	0%	n/a

(1) All vessels are required to be licensed but, beyond that, there is little effective management.

n/a = not applicable

Use of fishery management tools within the largest fisheries in Iraq

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Artisanal	Trawl fishery	No	No	Yes	No	Yes	No	No	No	No
	Gillnet fishery	No	No	Yes	No	Yes	No	No	No	No
Recreational	No recreational fisheries	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

n/a = not applicable

Costs and funding sources of fisheries management within the largest fisheries of Iraq

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries ¹	Resource rents
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	n/a	n/a
Artisanal	Trawl fishery	Yes	Yes	Yes	No	No	No
	Gillnet fishery	Yes	Yes	Yes	No	No	No
Recreational	No recreational fisheries	n/a	n/a	n/a	n/a	n/a	n/a

(1) Management agency receives an annual budget from the central Govt. Fisheries license fees charged are not specifically allocated to fisheries management activities.

n/a = not applicable

Compliance and enforcement within the largest fisheries in Iraq

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	n/a	n/a
Artisanal	Trawl fishery	No	No	No	No	No	
	Gillnet fishery	No	No	No	No	No	
Recreational	No recreational fisheries	n/a	n/a	n/a	n/a	n/a	n/a

n/a = not applicable

Capacity management within the largest fisheries in Iraq

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing? ¹	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	n/a
Artisanal	Trawl fishery	Yes	No	No data	No	
	Gillnet fishery	Yes	No	No data	No	
Recreational	No recreational fisheries	n/a	n/a	n/a	n/a	n/a

(1) No data but almost certainly decreasing for all exploited stocks

n/a = not applicable

Country review: Jordan

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INTRODUCTION

Jordan is almost entirely land-locked and only has a small (27 km) marine coast to the Red Sea, centered on the port of Aqaba. All marine landings in Jordan are made into this port. With a very small marine fishing industry and a declining freshwater fishing industry, Jordan is almost totally dependent on imports to meet its fish requirements (imports accounted for 98 percent of fish supply in 2001), although aquaculture production has been increasing in recent years and now accounts for around 50 percent of national fish production.

The marine fishing industry in Jordan is small and the fishery is entirely artisanal in nature, consisting of approximately 85 fishermen and 40 boats. Total catch in 2001 was 170 tonnes compared with catches from 1995 of 75 mt, and 45 mt recorded for 1993. A maximum recorded marine catch of 194 mt was taken in 1966. Of the catch in 2001 of 170 tonnes, about 65 percent were tuna with the increase in landings in recent years being almost solely attributable to increases in these tuna landings.

There are no cold storage facilities and catches are sold fresh upon landing, mainly to hotels and restaurants. Recreational SCUBA divers are reported to collect a small number of aquarium fish, but no indications of volume are available.

In addition to the marine catch, freshwater catches from the Dead Sea, bordered by Israel, Jordan and territory under the control of the Palestinian Authority, totaled about 350 tonnes in 2001, of which an unknown (but probably small) amount was landed in Jordan. The sea is supplied by the River Jordan, but Israel and Jordan divert 90 percent of the flow for agricultural purposes.

In addition to significant coral reefs, extensive seagrass beds occur along the Jordanian coast, particularly in the north and at Big Bay in the south. These areas appear to be important nursery areas for commercial fish species such as rabbitfishes, goatfishes, and parrotfish and may have regional, as well as local, significance in this regard.

Although fisheries legislation has been in place (and essentially unchanged) since 1943, there is no designated authority in Jordan responsible for fisheries management. The Ministry of Agriculture, however, has broad regulatory powers in the field of commercial fishing in the Territorial Waters of Jordan and, through the Agricultural Code of 1973 (Part IV, Articles 180-186, on Aquatic Resources) administers the licensing of fishermen and vessels, the prohibition on the use of explosives or other harmful fishing methods and the damaging or taking of coral. In addition, the Aqaba Regional Authority (ARA) has broad powers to control activities within Aqaba¹, including the inshore territorial waters in the Gulf of Aqaba. These powers encompass marine environmental protection and dispute resolution between fishing and other interests.

Jordan's prime concern for its marine areas is one of overall marine environmental protection (particularly of the coral reef areas in the Gulf of Aqaba) and the small

¹ Environmental assessment procedures and coastal zone management guidelines, developed under ARA supervision (through the ARA Environmental Unit, established in 1994) as part of the preparatory phase of the World Bank/GEF-sponsored Gulf of Aqaba Environmental Action Plan, may provide important future guidance to development activities in the Aqaba region. Regulations for the Jordanian portion of the Red Sea Marine Peace Park are also being developed under ARA supervision.

marine fisheries and fisheries resources are generally administered within this broader context.

POLICY FRAMEWORK

There is no designated authority in Jordan for fisheries management and, accordingly, the development of fisheries management policy has not occurred to any great extent. Fisheries are administered by the Ministry of Agriculture with this administration being restricted to licensing of fishermen and fishing vessels and simple regulations such as the prohibition of explosives for fishing.

The administration of the small marine fisheries industry of Jordan is undertaken within the broader context of marine environmental management. In particular, Jordan is active in protecting its coral reef areas (which form the basis of a thriving tourist and recreational fishing industry) and therefore restricts commercial fishing activities and harmful fishing methods in these coral reef areas.

Because of the small size of the marine territorial waters of Jordan, it is inevitable that many stocks are shared with neighboring countries, particularly Israel, Saudi Arabia and Egypt. Jordan and Egypt have a bilateral agreement for co-operation in fisheries management. In addition, regional co-operation in fisheries and marine environmental management between Jordan and Israel is achieved through the Comprehensive Fisheries-Ecosystem (CoFE) Management Program of the Red Sea Marine Peace Park Co-operative Research, Monitoring and Management Program (RSMMP Program).

The CoFE program is designed to focus on bi-national management (between Jordan and Israel) of the transboundary fisheries to relieve current pressures on fragile coral reef fisheries by transferring sustainable commercial fisheries into deeper waters. Under this program, commercial fishing activities have been encouraged to concentrate on deeper water resources such as tuna and this refocus has resulted in increases in tuna landings over the past few years to the point where these landings now comprise over 65 percent of total marine landings.

International fisheries issues are the responsibility of either the Council of Ministers directly or the Ministry of Agriculture. Jordan ratified the UN Convention on the Law of the Sea (UNCLOS) in 1995 but has not ratified the UN Fish Stocks Agreement or the FAO Compliance Agreement.

LEGAL FRAMEWORK

The basic fisheries law in Jordan is the Law on the Organisation of Fishing (Law number 25 of 1943) which replaced old Ottoman Laws. Subsequently, specific regulations were developed as follows: Fishing Regulation No. 1 of 1944 and Regulation implementing the Fishing Law (No. 249 of 1945). Article 2 of the Regulations gives a definition of "Transjordan" waters although this has been modified to a minor extent by the provisions of the UN Law of the Sea following Jordan's ratification of UNCLOS in 1995. This includes that part of the sea which is contiguous to the coast of Jordan and lies within a distance of three nautical miles from the low-water line. The provisions of the Fishing Law Regulations apply to commercial fishing in marine waters only (Art. 3). Articles 4 to 6 deal with fees for licenses for catch. Article 7 prohibits the use of explosives in marine and freshwater. Powers of enforcement of public officials are specified in Article 8. The Council of Ministers shall regulate all matters listed in Article 9. The remaining articles provide for fines and offences (17 articles).

As noted above, the basic Fisheries Law does not allocate responsibility for fisheries management to any organization, apart from the Council of Ministers. However, in accordance with more general marine environmental management in Jordan, the Agricultural Law No. 20 of 1973 (Part IV, Articles 180-186, on Aquatic Resources) provides for broad regulatory powers of the Minister of Agriculture in the field of commercial fishing in the Territorial Waters of Jordan. The Law prohibits the

following: fishing without authorization (Art. 182); use of explosives or other harmful fishing methods and the damaging or taking of coral (Art. 183).

In 1995, Jordan introduced the Law No. 12 on Environmental Protection. This Law, among other provisions, bans the destruction or removal of coral or shellfish from the Gulf of Aqaba. Article 25 of this Law also specifies fines and prison terms for violators.

STATUS OF THE FISHERIES

The small commercial fishing fleet, based in Aqaba, uses shallow-water (5 to 15 meter) baited cage traps, hand-drawn gill and seine nets, and handlines with baited hooks and lures to take both reef fish and pelagic species. As Jordanian fishing vessels are barred from operating outside Jordan's confined territorial waters², the local fishing fleet consists entirely of small outboard motor boats, approximately five meters in length. With marked reductions in the abundance and diversity of coral-dwelling fish, observed in recent years, have been partially attributed to current fishing practices (PERSGA, 2001).

Total landings and the number of fishermen in Jordan's marine fisheries have remained static since about 1998, after landings had increased from around 90 tonnes to 170 tonnes as a result of increased catches of tuna in deeper waters. However, no assessment of the stocks of commercial demersal or pelagic fish has been undertaken in Jordanian waters and the status of most stocks remains uncertain. Such assessments would, in any case, be difficult without taking into account the almost certain extended range of Jordanian commercial fish into the waters of neighboring countries.

Major commercial fish species (including grouper and tuna species) are thought to be over-exploited in neighboring countries, particularly in Saudi Arabia and Egypt and it is likely that this impacts the stocks in Jordanian waters. As a result, fish stocks in Jordanian waters probably have limited development prospects and are also threatened by increasing environmental concerns, particularly relating to the fishing activities in coral reef and seagrass nursery areas.

Despite the lack of comprehensive stock assessments of the major species, the generally accepted view is that the pelagic and particularly the demersal finfish resources in Jordanian waters are already intensely exploited.

Increasing recreational fishing and environmental issues such as increased shipping into Aqaba are also emerging as significant issues in Jordan's marine fisheries.

Detailed statistics on catches and fishing capacity are not collected to enable stock assessment studies to be undertaken. Also, research that is undertaken on marine fisheries is rarely directly focused on management issues but is more often designed to provide background biological information on the marine species in general. The Marine Science Station of Jordan University carries out marine and fisheries research, with research programs being focused on the biology of commercial species, marine ecosystem studies (particularly coral reef and seagrass bed studies) and aquaculture.

MANAGEMENT ACTIVITY

There are no stated national objectives or goals regarding management of any of Jordan's fisheries and no management plans exist for any of the country's fisheries. In addition, there is minimal enforcement of the few regulations that do exist so that, in essence, the marine fisheries of Jordan are not managed in any meaningful way.

The only management requirements currently in force in Jordan's marine fisheries are:

² Fishing is concentrated in or immediately adjacent to reef areas and damage to reefs from short-line anchors, snagged nets and lines, abandoned bait traps, and direct human contact is an ongoing concern.

- A prohibition on the use of explosives for fishing.
- A requirement that all fishermen be licensed and pay not only an annual license fee but also a levy on the quantity and type of fish product landed.

Any stakeholder participation in the development of fisheries policy and management measures is through traditional discussions, often directly with the local senior representative of the Ministry of Agriculture.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Since there is no single organization with responsibility for fisheries management, no separate data is available within the Jordanian Ministry of Agriculture or elsewhere on the costs that are directly attributable to fisheries management issues. However, these costs are minimal. Any enforcement that is undertaken is done by the Jordanian Police and, again, no separate data are available on these costs.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Jordan ratified the UN Convention on the Law of the Sea (UNCLOS) in 1995 but has not ratified the UN Fish Stocks Agreement or the UN Compliance Agreement.

Issues such as the Code of Conduct for Responsible Fisheries have not been incorporated into national legislation and have not been considered as part of national fisheries regulations.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird bycatch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Jordan has bilateral marine environment and fisheries agreements with Egypt and Israel but does not participate in any specific regional fisheries body.

SUMMARY AND CONCLUSIONS

The landings from the marine fisheries of Jordan are minimal and, in 2001, amounted to around 170 tonnes, taken by about 40 small artisanal vessels fishing in the Gulf of Aqaba. The majority of this catch (more than 65 percent) was tuna with the remainder being demersal reef fish, taken mainly by line fishing. The marine fishing industry is therefore insignificant in meeting Jordan's fisheries requirements, the vast majority of which is imported.

Because of the small size of the marine fishing industry in Jordan, fisheries management is not undertaken in any meaningful way. There is no single organization with responsibility for developing fisheries policy, although licensing and other administrative activities are undertaken by the Ministry of Agriculture.

Marine fisheries are likely to remain insignificant in Jordan while their management will be increasingly incorporated into more general marine environmental management, particularly management measures to protect Jordan's coral reef and seagrass areas. In addition, because it is highly likely that Jordan's commercial marine fish species are shared stocks with neighboring countries, effective management both of the stocks and of the marine environment that supports them will require a regional approach rather than unilateral action by Jordan alone. Jordan has already implemented several bilateral agreements to address this regional approach.

REFERENCES

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APPENDIX TABLES

Characteristics of the largest (and only) marine artisanal fishery of Jordan, which is carried out in the Gulf of Aqaba of the Red Sea

This artisanal fishery is a multi-gear, multi-species fishery that targets demersal reef fish, rabbitfish (*Siganus* spp.) and various tuna species, mainly using handlines. There is also a growing recreational boat fishery, although no data is available on this fishery.

Category of fishery	Fishery	Volume (Est. in tonnes)	Value* US\$	% of Total volume caught	% of Total value caught**	Covered by a management plan?	# of Participants (Est.)	# of Vessels (Est.)
Artisanal	Gulf of Aqaba	170	\$0.5m	100%	100%	No	85	40

* Estimated Value in 2002 U.S. Dollars.

Current management of marine capture fisheries in Jordan

Level of management	% Fisheries managed ¹	% with Fisheries management plan	% with Published regulations	Trends in the number of managed fisheries over ten years (increasing/decreasing/unchanged)
National	nil	nil	nil	Unchanged
Regional	n/a	nil	n/a	n/a
Local	n/a	nil	n/a	n/a

(1) 'Managed' is taken to mean significant management intervention by Government or others. All fishermen and fishing vessels are required to be licensed but this, by itself, is not considered 'managed'.

Use of fishery management tools within the three largest fisheries in Jordan

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes	No
Artisanal	Gulf of Aqaba	No	No	No	No	Yes	No	No	No	No
Recreational	No significant recreational fisheries	No	No	No	No	No	No	No	No	No

n/a = not applicable

Costs and funding sources of fisheries management within the three largest fisheries of Jordan

Category of fishery	Fishery	Do management funding outlays cover			Are management funding sources from		
		R&D	Monitoring & enforcement	Daily management	License fees in fishery	License fees from other fisheries ¹	Resource rents
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	n/a	n/a
Artisanal	Gulf of Aqaba	No	No	No	No	No	No
Recreational	No significant recreational fisheries	No	Yes	Yes	No	Yes	No

(1) License fees, and other fisheries-related revenue, are paid to the Jordanian general Government revenue. There is no specific link between the revenues collected and the budget allocation for management of fisheries.

n/a = not applicable

Compliance and enforcement within the three largest fisheries in Jordan

Category of fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	n/a	
Artisanal	Gulf of Aqaba	No	No	No	No	No	
Recreational	No significant recreational fisheries	No	No	No	No	No	

n/a = not applicable

Capacity management within the three largest fisheries in Jordan

Category of fishery	Fishery	Does overfishing exist? ⁽¹⁾	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, specify objectives of capacity reduction programme
Industrial	No industrial fisheries	n/a	n/a	n/a	n/a	
Artisanal	Gulf of Aqaba	Yes	No	Decreasing	No	
Recreational	No significant recreational fisheries	Yes	No	No data	No	

(1) Because there are few, if any, stock assessments of major fish stocks, the responses are the author's opinions, based on published information and consensus of national and foreign scientists.

n/a = not applicable

Country review: Kuwait

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INTRODUCTION

Kuwait is situated in the northwestern corner of the Gulf that separates Iran from the Arabian Peninsula and has a small coastline to that Gulf. The sea area and coastline of Kuwait is characterized by extreme meteorological and hydrological conditions with water temperatures reaching over 33°C during summer months (air temperatures of over 50°C), very high evaporation rates and high salinities. Seasonal variation in hydrological parameters is also high with water temperatures varying from around 15°C in winter to 32°C in summer. Apart from the important shrimp fishery, which is undertaken both as an industrial, export-orientated fishery and as an artisanal fishery, the fisheries of Kuwait are generally small and include a multi-species, multi-gear fishery that is directed towards various demersal and pelagic fish species. Like other countries of the region, many of these species utilize the Gulf waters of Kuwait on a seasonal basis, often for spawning, although some major species are found in the area throughout the year.

In general, the management of fisheries in Kuwait is not well developed although some management measures have been in place for the industrial shrimp fisheries since the early 1980s. Fisheries are insignificant from an economic point of view in Kuwait and therefore are of a low political significance.

Kuwait's fisheries primarily consist of two distinct sectors: the industrial shrimp fishery and the artisanal fishery that operates small trawl nets, fish traps (locally known as 'gargoor', gillnets, handlines and fixed stake nets (locally known as 'hadra') to take demersal and pelagic fish species as well as shrimp.

An active research program, which until recently included the collection of detailed catch and fishing effort data, is carried out by the Kuwait Institute for Scientific Research (KISR) on major commercial species. Recent estimates indicate that, in 2001/2002, shrimp landings totaled 2 206 tonnes with 1 348 tonnes coming from the 35 industrial shrimp trawlers and the remainder from the fleet of 33 artisanal dhows. Landings of fish species for the same period included 1 132 tonnes as bycatch from shrimp trawling activities (although actual catches of bycatch species is much larger), approximately 3 700 tonnes from the gillnet and fish trap fishery and an estimated 2 700 tonnes from the stake net (hadra) fishery. Catches and catch rates of many fish species have declined significantly in recent years with 2001 fish catches being the lowest on record.

The monitoring and management of commercial fisheries has deteriorated in recent years with budgets for research, monitoring and surveillance being limited. As a result, detailed collection of landing statistics and fishing effort, which had been undertaken by KISR since the late 1970s has been discontinued, although market sampling of the quantity of receivals into the main fish markets continue to be collected by the Central Statistical Office.

POLICY FRAMEWORK

The national or federal authority with responsibility for fisheries management is the Public Authority for Agriculture and Fisheries Resources (PAAFR).

The subsidization of local fisheries remains an important part of Government management policy and measures. As part of this direct subsidization program (which is usually in the form of cash grants), the Government's response in 2003 to declining levels

of fish catch has been to double the level of direct subsidies to the industry in an effort to retain domestic prices at affordable levels and to support the profitability of the operators. Only the Kuwait nationals who are vessel owners, benefit from these subsidies since foreign workers on the vessels are engaged on a contract basis.

Local Municipalities undertake administration of fisheries-related infrastructure, such as the important local fish landing sites, fish markets and Fishermen's Co-operatives. Informal co-operation between these authorities and PAAFR is generally well developed.

The requirement to develop fisheries management plans is not contained in any legislation and no fisheries management plans currently exist for any fishery. As a result, policy directions for management of individual fisheries are not explicit and are often subject to change through political or administrative influences.

In 2001, Kuwait published a comprehensive Marine Strategy aimed at an integrated approach to the management of its marine areas, including fisheries. However, implementation of the strategy has not yet taken place.

PAAFR is also the agency with responsibility for international fisheries issues. However, regional co-operation is weak although a bilateral Agreement with Saudi Arabia was implemented in 2000 to define the status of the marine resources (including fisheries) on the border between Saudi Arabia and Kuwait. Kuwait has ratified the UN Convention on the Law of the Sea (UNCLOS) but not the UN Fish Stock Agreement nor the FAO Compliance Agreement.

LEGAL FRAMEWORK

Responsibility for fisheries management in Kuwait lies with PAAFR although national and regional environmental authorities (particularly the Regional Organization for the Protection of the Marine Environment, ROPME and the Kuwait Environment Protection Authority, EPA) have influence in management of marine areas. In particular, the EPA, working with ROPME, are responsible for marine reserves in Kuwait.

PAAFR administers the basic national fisheries legislation in Kuwait, which is contained in law No. 46 of 1980 on protection of fisheries resources. This is the basic fisheries law and includes regulations that address, among other things, (a) the right of fishing and exploitation of marine resources that shall be determined by a decree (b) regulation of foreign vessels which can only fish with a license issued by the competent minister (c) the requirement that all fishing vessels shall be owned by a citizen of Kuwait (d) the requirement that licenses should be issued to fishermen operating licensed fishing boats and (e) regulating gears used in fishing, and with cooperation of other departments to enforce regulations and law.

Numerous Decrees have been issued under this Law that elaborate specific regulations for management of fisheries. Most of these Decrees have remained unchanged since the early 1980s and specify, among other things, licensing of intertidal stake nets (Decree no. 20 of 1980), minimum mesh sizes of shrimp fishing nets (Decree No. 23 of 1980), minimum sizes for a variety of fish species (Decree No. 8 of 1983) and prohibiting commercial fishing within Kuwait Bay and within three miles of the coast (Decree No. 11 of 1983). The flavor of Law Number 46 and the various Decrees issued under the Law is very much concerned with fisheries administration and there are no specific management policy objectives elaborated to guide fisheries management. Local legislation (administered by local Municipalities or the Ministry of Planning) regulating coastal development and the operation of fisheries infrastructure, such as ports, markets, landing sites etc., also impacts significantly on fisheries management legislation. The coastal development legislation and processes is particularly important in impacting on fisheries resources and their management, given the extensive coastal development and urbanization that is occurring in Kuwait.

STATUS OF THE FISHERIES

The fisheries of Kuwait can be separated into the industrial shrimp fishery (with 35 twin-rigged shrimp trawlers) and the artisanal fishery, which utilizes traditional dhows and

small outboard-powered fiberglass vessels. The artisanal fleet lands about 90 percent of the finfish landings of approximately 3 700 tonnes (with a further estimated catch of 2 700 tonnes being taken by the fixed stake net fishery) and 45 percent of the shrimp landings¹. The shrimp fishery is an important part of the fishing sector with 35 industrial trawlers and 33 wooden dhows being licensed to take shrimp.

The industrial shrimp fishery² started in the early 1960s, and expanded rapidly. With this expansion, however, catches also dropped rapidly resulting in the introduction of management measures in 1980, including closed seasons, protected areas (Kuwait Bay and three-mile coastal zone), mesh size regulations and effort limitation in order to optimize shrimp productivity.

As a result of these management measures, and particularly with the reduction in the number of industrial vessels in the mid-1980s, shrimp landings rose to between 4 000 and 5 000 tonnes in 1988 and 1989. However, after the 1991 liberation of Kuwait from Iraqi occupation, industrial fishing capacity was permitted to increase to 35 vessels (with illegal fishing by dhow vessels in the nursery areas of Kuwait Bay also being common) with the result that catches and catch rates have been reduced. In recent years, these have averaged around 2 500 tonnes. Shrimp exports have also been reduced.

There is therefore a general consensus that Kuwait's shrimp fishery is suffering from overcapacity with the result that catches, average sizes and catch rates are sub-optimal.

The fish bycatch taken as part of shrimp trawling by both industrial and artisanal fleets is an important component of the catch and revenue from shrimp fishing, with the fish catch rate being significantly higher than the shrimp catch rate. Despite the importance of this fish bycatch, trials are being undertaken on bycatch reduction devices (BRDs) for possible introduction into the shrimp fishery.

Kuwait's fishing fleet targeting finfish species is composed of two types of fishing vessels, namely, wooden dhows, and speedboats. These vessels are licensed to use only one type of gear which can be hemispherical wire traps (*gargoor*), drift gillnets or fixed gillnets of various mesh sizes. The registered finfish fleet consists of 120 dhows, using gargoor (94 boats) and gillnets (26 boats), and 748 speedboats (7 m) using gargoor (28 boats) and gillnets (720 boats) although not all of these may be active. The number of active fiberglass boats, which are equipped with outboard engines of 200 hp, varies seasonally. The number of inter-tidal stake nets (*hadra*) declined from 120 in the 1980s to about 30 in 1997. However, a recent survey has indicated that the number of these fixed stake nets has increased significantly in recent years and, in 2003, 522 stake nets were operating at 359 sites, mainly within Kuwait Bay.

Catches of finfish taken by vessels have been decreasing significantly in recent years, reaching a record low of 3 500 tonnes in 2001. The main contributor to this decline has been the important and high value species of zobaidy (*Pampus* spp.) and suboor (*Tenualosa* spp.).

The characteristics of the largest fisheries in Kuwait are shown in Table 1.

Although overcapacity and the common occurrence of illegal fishing is apparently a major contributing factor to these declines in fish catches, it has also been suggested that the declines are linked to the changed hydrographic conditions in the northern Gulf as a result of the draining of the marshes in southern Iraq and the reduced freshwater inflow to the Gulf from the Tigris and Euphrates rivers. Several research programs are being planned to address this issue.

The once-important pearl oyster fishery was closed in the late 1990s for reasons that are unrelated to stock issues but more related to religious/political imperatives. Recent surveys of pearl oyster stocks in 2003 and 2004 show that abundance is similar to that of the last survey in 1989.

¹ The proportion of the total shrimp landings that are taken by the artisanal fishery has increased since the 1980s from about 24 percent prior to 1991 to the current 45 percent (Ye *et al.*, 1999)

² The shrimp fishery takes a number of species, the most important of which is *Penaeus semisulcatus*, which comprises about 60 percent of annual shrimp landings. *Metapenaeus affinis* comprises about 30 percent of total landings.

TABLE 1
Characteristics of the major fisheries of Kuwait

Category of fishery	Fishery	Volume tonnes	Value ² US\$	% of Total volume caught	% of Total value caught**	Covered by management plan? (Yes/No)	# of Participants	# of Vessels
Industrial	Shrimp ¹	990	\$ 6.6m	100%	25.4%	No	385	35
	Shrimp	1 210	\$8.1m	12.3%	15.9%	No	230	33
Artisanal	Finfish	5 883	\$29.4m	60.1%	57.6%	No	2 240	868
	Stake net (hadra)	2 700	\$ 13.5m	27.6%	26.5%	No	522	n.a.
Recreational	Demersal	No data	No data	n.a.	n.a.	No.	No data	No data

1. Does not include fish taken as a bycatch to industrial shrimp fishing operations.

2. Value in 2002 U.S. Dollars.

n.a.: not applicable

Although there is an active recreational fishery in Kuwait, taking demersal species from small speedboats, no data is available on the landings or the number of participants in this fishery. Recreational vessels need to be registered although there is no requirement for recreational fishing licenses.

Although an ongoing program of shrimp and fish stock assessment is maintained by KISR, these assessments of the status of Kuwait's fish stocks have been made more difficult in recent years with the cessation in 2000 of a program (initiated in the 1970s) to measure fishing effort.

MANAGEMENT ACTIVITY

Kuwait was one of the first countries in the region to introduce management measures for its fisheries, particularly the important shrimp fishery. These management measures included closed areas, minimum mesh sizes and fishing capacity limitation through limited entry. In addition, an active capacity reduction program in the shrimp fishery in the mid-1980s³ resulted in catches, catch rates and average sizes increasing with catches reaching 4 000-5 000 tonnes in 1988.

Since the liberation of Kuwait from Iraqi occupation in 1991, management systems have deteriorated significantly. However, current management activity still includes:

- A closed fishing season for shrimp that starts in February or March depending on the catch rates during January. While the season has opened on 1st September for many years, industry pressure because of declining catches resulted in the season being opened on August 1 from 2002.
- Closed areas to protect spawning as well as recruitment of both shrimp and finfish; these areas are Kuwait Bay and the three mile zone from the coast.
- Effort limitation; entry to the shrimp fishery is limited by 35 industrial boats and 33 artisanal dhow boats although this is greater than in the 1980s.
- A minimum mesh size for shrimp trawls of 45 mm stretched.
- Minimum marketable sizes for commercially important fish species.
- Minimum mesh size of drift gillnets according to the targeted species.

In addition to the deterioration of management systems and measures, the enforcement by PAAFR of those management measures still in place has been sporadic⁴. As a result, illegal fishing (including fishing in closed areas such as the nursery areas of Kuwait Bay) is common.

³ This capacity reduction program was introduced in 1989 by Ministerial Decree 727/88 and involved a Government buy out of the licenses of 63 artisanal shrimp vessels and 32 industrial trawlers. This buy out represented a 50 percent reduction in the number of industrial shrimp vessels and a 75 percent reduction in artisanal vessels. As a result, fishing effort was reduced and shrimp landings and catch rates increased significantly during the 1988/89 and 1989/90 seasons.

⁴ For example, illegal trawling by small vessels (often speedboats fitted with trawl nets) in closed shrimp nursery areas of Kuwait Bay supplied an active black market for shrimp during the closed season of June-August (Ye *et al.*, 1999).

The cessation in 2000 of a program to measure fishing effort (which had been implemented in the 1970s) has significantly impaired the ability of Kuwait to monitor the status of its fisheries resources in any meaningful way. As a result of this lack of key data, assessment of stocks is not undertaken on a regular basis as the basis for management decisions.

No formal management plans exist for any fishery although the shrimp fishery tends to be subjected to more management intervention than the finfish fishery, which is only lightly regulated. In the absence of management plans, however, these management arrangements even for the shrimp fishery are not implemented within a strategic context and management objectives often remain unclear.

Stakeholder participation in the development of fisheries policy and management measures is through traditional discussions, often directly with senior Government officials. In general, these discussions are often concerned with subsidies and any other management issue discussed often results in compromise solutions. Such stakeholder participation is limited to nationals only, who are the vessel owners and may or may not be actively engaged in fishing. The expatriate workers on the vessels are not involved in such dialogue on management measures.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No separate data is maintained by PAAFR on the costs that are directly attributable to fisheries management issues. However, over the past ten years, budgets for fisheries management has certainly stagnated as management activities decline.

A significant part of the fisheries budget within PAAFR is utilized for the payment of subsidies to vessel owners. These subsidies are often at the discretion of the Minister and are often ad hoc in response to specific representations from fishers.

The budget for research services, which are mainly undertaken by the Kuwait Institute for Scientific Research, has generally been maintained over the past decade although an increasing proportion of the budget is being sourced from specific external contracts. These often have only marginal relevance to fisheries management issues and are becoming more orientated towards general marine environmental issues. This change has resulted in the cessation in 2000 of the program to measure fishing effort (previously funded since the 1970s by KISR) although a research program on bycatch reduction devices has recently commenced.

Compliance is undertaken both by PAAFR in co-operation with the Coast Guard, both of whom have the capacity to undertake at-sea inspections. Again, no separate accounting of compliance and enforcement costs is maintained within PAAFR. At-sea enforcement by the Coast Guard is also not accounted separately since fisheries-related issues are generally attended to during regular sea patrols for other purposes.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Kuwait ratified the UN Convention on the Law of the Sea (UNCLOS) in 1986 with ratification of Part XI of the Convention related to deep seabed mining in 2002. Kuwait has not ratified the UN Fish Stocks Agreement nor the UN Compliance Agreement.

Although PAAFR are aware of the content of initiatives such as the Code of Conduct for Responsible Fisheries, the provisions of this, or other initiatives, have not been incorporated into national legislation.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird bycatch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Kuwait is an active member of the Regional Commission on Fisheries (RECOFI) and participates in most of the meetings and working groups of the Commission. However, there is no real commitment to regional fisheries management by members

of RECOFI and, as a result, the Commission is singularly ineffective in developing and implementing regional fisheries management initiatives.

As a result of this ineffectiveness of RECOFI, there have been no regional fisheries management initiatives emanating from RECOFI. Kuwait, therefore, has not been required to incorporate regional fisheries management issues into its national legislation.

There is, however, no legal requirement within the Kuwait fisheries legislation for fisheries management issues that may be adopted by RECOFI (or other regional bodies) to be incorporated into national legislation.

SUMMARY AND CONCLUSIONS

Kuwait was a leader in fisheries management in the region but, since the liberation of Kuwait from Iraqi occupation in 1991, the effectiveness of fisheries management has declined significantly. This is partly a result of a refocusing of political commitment, including subsidizing Kuwaiti national vessel owners, and partly a result of a stagnation of the budget for fisheries monitoring, control, surveillance and research.

As a result, the fisheries of Kuwait are suffering from overcapacity and reduced catches and catch rates, with finfish landings reaching record lows in 2001. The explanation of the declines in landings have been interpreted as partly a result of changed hydrological conditions in the northern Gulf although the contribution of fishing effort changes cannot now be assessed because the program designed to measure fishing effort was terminated in 2000.

Illegal fishing and a deterioration of fisheries monitoring and management systems since 1991 has resulted in apparent stock declines for many important fish stocks. The challenge for the Kuwait authorities is to re-establish their position as a regional leader in fisheries management and to address the rehabilitation of not only their national fish stocks but also their supporting monitoring, management, surveillance and research infrastructure systems.

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APPENDIX TABLES

Current management of marine capture fisheries in Kuwait

Level of management	% Fisheries managed	% with Fisheries management plan	% with Published regulations*	Trends in the number of managed fisheries over ten years (increasing/decreasing/unchanged)
National	> 67%	< 33%	< 33%	Unchanged
Regional	< 33%	< 33%	< 33%	Unchanged
Local	< 33%	< 33%	< 33%	Unchanged

Use of fishery management tools within the three largest fisheries of Kuwait

Category of fishery	Fishery	Restrictions				License/limited entry	Catch restrictions	Rights-based regulations	Taxes/royalties	Performance standards
		Spatial	Temporal	Gear	Size					
Industrial	Shrimp	Yes	Yes	Yes	No	Yes	No	No	No	No
	Shrimp	Yes	Yes	Yes	No	Yes	No	No	No	No
	Finfish	Yes	No	Yes	No	Yes	No	No	No	No
	Stake net (hadra)	Yes	No	Yes	No	Yes	No	No	No	n.a.
Recreational	demersal	No	No	No	No	No	No	No	n.a.	No

n.a: not applicable

Costs and funding sources of fisheries management within the three largest fisheries

Category of fishery	Fishery	Do management funding outlays cover			Are management funding sources from		
		R&D	Monitoring & enforcement	Daily management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Shrimp	No	Yes	Yes	No	No	No
	Shrimp	No	Yes	Yes	No	No	No
	Finfish	No	Yes	Yes	No	No	No
	Stake net (hadra)	No	Yes	Yes	No	No	No
Recreational	Demersal	No	No	No	No	No	No

Compliance and enforcement within the three largest fisheries

Category of fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Shrimp	No	No	No	No	No	Yes (At-sea response to reports of illegal activity)
	Shrimp	No	No	No	No	No	Yes (At-sea response to reports of illegal activity)
Artisanal	Finfish	No	No	No	No	No	Yes (At-sea response to reports of illegal activity)
	Stake net (hadra)	No	No	No	No	No	Yes (At-sea response to reports of illegal activity)
Recreational	Demersal	No	No	No	No	No	None

Capacity management within the three largest fisheries of Kuwait

Category of fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Shrimp	Yes	No	Constant or decreasing	Yes (1989)	<ul style="list-style-type: none"> Increase spawning stock Economic optimization
	Shrimp	Yes	No	Constant or decreasing	Yes (1989)	As above
Artisanal	Finfish	Yes	No	Constant or decreasing	No	n.a.
	Stake net (hadra)	Yes	Yes	Increasing	No	n.a.
Recreational	Demersal.	No data	No.	No data.	No.	n.a.

Country review: Oman

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INTRODUCTION

The Sultanate of Oman is situated on the south east corner of the Arabian Peninsula and borders the Arabian Sea and Gulf of Aden in the south and the Gulf of Oman on the northeast (or Batinah) coast. The two sea areas of Oman are very different in character with the southern and south-east coasts being influenced by seasonal monsoons from late August to November each year. This monsoonal activity results in extensive upwellings along the coast and a high marine productivity. By contrast, the Batinah coast is not directly influenced by these monsoons and, as a result, its marine productivity is generally lower and the species assemblages differ from those of the southern coasts. The most easterly point of Oman at Ras al-Hadd is, for many marine species, a key boundary between these two marine areas.

Oman has traditionally been a major producer of fish in the region with exports of dried sardines, in particular, to neighboring countries being a trade that has existed since antiquity. The artisanal fisheries sector remains the largest by volume in the country and provides the main economic activity of many rural coastal regions of Oman. These traditional fisheries are also important in the cultural life of many villages with traditional management techniques (such as territorial use rights) having been developed in many areas. However, with the rapid economic development of Oman and the consequent lessening of the insularity and independence of many of the coastal communities, these traditional management methods have become less workable and a more national approach to fisheries management and development has been pursued. Within this more national approach, however, the continuing importance of regional and local community's input into fisheries management issues is recognized.

In addition to the major artisanal fishery, Oman has also recently (since the 1980s) developed an industrial scale fishery based initially on foreign fishing agreements with several countries. However, Omani Companies have also become major participants in this industrial fishery, which is based on demersal trawling for fish and cuttlefish and longlining for large pelagic species, particularly tuna. The industrial fishery remains, however, a much smaller component of fisheries production than the artisanal fishery.

With these fisheries sectors, Oman has remained one of the few net exporters of fish and fisheries products in the region with production exceeding local demand by some 20 000-30 000 tonnes each year. The industry contributes around 54 percent to Agricultural GDP each year (around 1.1 percent to total GDP) and has been targeted by the Government as a major focus for further economic development. Most of the exported fish is as whole fresh product (most significantly to the United Arab Emirates and Saudi Arabia) although various attempts have been made to produce processed or value-added products. Canning of tuna or sardines has not been particularly successful while value-added products produced by the largest fisheries company in Oman (the partly Government-owned Oman Fisheries Company) have been well received in export markets.

While Oman has a well-developed fisheries management infrastructure, including a significant and well-staffed management agency (The Directorate General of Fisheries Resources) and a dedicated fisheries research institute, the challenges of achieving

effective management of fisheries resources in the country remain formidable. The large size of the country, the artisanal nature of most of the fisheries and the continued political importance of local tribal and regional administrations makes centralized control difficult. These difficulties also make monitoring and enforcement of fisheries regulations a major challenge and illegal fishing (including unlicensed fishing) is common. As a result, several important fish stocks have come under increasing exploitation pressure, particularly the high-valued species of rock lobster, abalone and some demersal species, and are generally considered over-exploited.

However, Oman has been, and continues to be, active in addressing its fisheries management problems and is also active in furthering regional co-operation in management. The challenges remain, however, significant.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Oman is the Ministry of Agriculture and Fisheries, Directorate General of Fisheries Resources (DGFR). The DGFR is based in Muscat with various regional offices around the country. The DGFR is also responsible for the Marine Sciences and Fisheries Centre (MSFC) which has laboratories on the coastal outskirts of Muscat and provides the research and stock assessment background for fisheries management decisions. The DGFR also has a small research facility at Salalah in southern Oman and also administers the Youth Training Programme which is designed to train young Omanis in fishing techniques.

The DGFR administers the Marine Fishing and Living Aquatic Resources Protection Law, 1981 which is the basic fisheries legislation. This legislation, and subsequent Ministerial Decrees and objectives stated in various fisheries strategic plan, specify that the prime objectives of fisheries management in Oman are:

- Development and modernization of fisheries sector;
- Development of fisheries exports;
- Enhancement of economic diversification of the country through fisheries development;
- Development of fisheries-related industry;
- Development of aquaculture projects;
- Enhancement of the future production and value of Oman's coastal fisheries and the well being of the people and coastal communities.

The policy objectives are therefore very much development-orientated rather than conservation orientated although management measures are in place in many fisheries (see below) in an effort to ensure sustainable exploitation. This development orientation is further re-enforced by the structure of the DGFR which has major Departments of Fisheries Resources Development and Fisheries Extension, in addition to a Licensing and Surveillance Department. The DGFR also administers the Fisheries Encouragement Fund, established in 1976 which is designed to upgrade the economic, social and technical standards of the traditional fishermen, and to realize optimal utilization of fisheries. The Fund has had a significant impact on modernization of the traditional inshore fleet by supplying motors, fishing gear etc and generally upgrading the fleet.

The DGFR also administers the Fisheries Research Fund (FRF) which was established in 1991 to provide finance for fisheries research and development projects.

Although Ministerial statements are made annually on the direction for fisheries management and development, and despite the publication in the past of various 5-year strategic plans for the fisheries sector¹, these strategic plans and directions are

¹ These date from the 1970s (covering the years 1976-1981) and were often financed by, and prepared with technical co-operation from, external donors, particularly USAID.

only broadly followed, if at all. As a result, strategic planning for long term fisheries management and development is not well advanced or part of the culture of management of fisheries in Oman. There are no formal management plans for any fisheries in Oman and management decisions are generally made on an *ad hoc* basis to address immediate specific issues. The ability to make these *ad hoc* decisions is facilitated by the nature and age of the legislation and the traditional, legislated way of centralised management decision making through the issuing of Ministerial or other Decrees.

Industry participation in management processes, although minimal, is improving with the formation of regional Fisheries Committees, which are designed to act as communication mechanisms between the DGFR and the often influential Regional Governorates. However, these Committees have not yet reached the stage of development where they are able to participate significantly in fisheries management decision making. The tension between the traditional influence and involvement of local Governorates in fisheries activities and the more recent, centralised approach of the DGFR is often cited as a contributing factor to the widespread abuse of fisheries regulations in the artisanal fisheries, including the need to possess fishing licenses issued by the DGFR.

The DGFR and the Ministry of Agriculture and Fisheries co-operates with other agencies involved in marine issues. In particular, there are three main agencies that have policy input into fisheries and marine management. These are:

- The Ministry of Regional Municipalities and Environment, which was founded in 1984 and was the first such environmental Ministry in the Arab world.
- The Ministry of Communications, Directorate General of Ports and Maritime Affairs, which is responsible for maritime pollution and response. The Directorate plays an important role in developing a legislative framework to protect the marine environment and ensuring the integration of oil spill contingency plans into oil spill surveillance, monitoring, and enforcement.
- Sultan Qaboos University, College of Fisheries which not only runs degree programs for fisheries managers and scientists but also undertakes fisheries research.

Funding for the DGFR to undertake its responsibilities comes from annual funding allocations from the Government. Revenues from fishing activities come principally from royalties and fishing license fees, particularly from the industrial fishery. In addition, 20 percent of fines levied by the Courts for illegal fishing activities is returned to the DGFR and is maintained in a separate budget item for fisheries surveillance use. The amount available from this source has, however, reduced dramatically in recent years, from approximately OR 500 000 (US\$ 1.35 million) in 1999 to OR 200 000 (US\$ 0.5 million) in 2001, through a reduction in violations issued. This trend has continued into 2002² and hence it may be expected that the reduction in funds available from this source will continue. The Fisheries Encouragement Fund and the Fisheries Research Fund are funded and administered separately to the general budget of the DGFR.

The Government also has been involved in various aspects of industrial fishing production, marketing, processing, and export of fish and fisheries products. In 1980, the Oman National Fisheries Company (ONFC) was formed with Government assistance to purchase, distribute, and export the catches of local fishermen. It also handled fish caught by concessionaires. In 1987 the Oman Fisheries Company (OFC) was established, into which the ONFC was merged, with RO 30 million (US\$ 81.5 million) being received as subscriptions from shareholders. The Government retains a shareholding in OFC.

International fisheries issues are also the responsibility of the DGFR. Oman is an active member of the Indian Ocean Tuna Commission and the Regional Fisheries

² Up to June 2002, the last month for which data is available, no violations had been issued.

Commission (RECOFI)³. Oman ratified the UN Convention on the Law of the Sea (UNCLOS) in 1989 but has not ratified the UN Fish Stocks Agreement or the FAO Compliance Agreement.

LEGAL FRAMEWORK

The basic fisheries law of Oman is contained within the Marine Fishing and Living Aquatic Resources Protection Law, 1981 ('The Fisheries Law'). Executive Regulations of the Law have been subsequently issued in 1982 (Ministerial Decision No. 3/82) and in 1994 (Ministerial Decision 4/94). The law has six sections, covering definition, handling, marketing and processing, violation and penalties and general provisions. The Executive Regulations deal with Marine Fishing Licences, Licence Fees, Protection and Development of Living Aquatic Resources, Regulation of Fishing, Preservation, Transport and Marketing of Living Aquatic Resources, General Provisions and Penalties.

Other relevant legislation includes Ministerial Decision No. 136/98 of 1998 concerning Quality Control Regulations of Omani Exported Fish and Ministerial Decision No. 121/98 of 1998, concerning Conditions and Specifications of Industrial Fishing Vessels Equipped for Preservation and Handling of Fish Products. Other Ministerial Decisions have also been issued from time to time.

The Fisheries Law defines the powers of the DGFR and provides for a range of mechanisms to develop the fisheries sector. While its prime focus is fisheries development, it does contain provisions for controlling fishing activities and for protecting marine life and habitats, particularly within the Executive Regulations. The Fisheries Law and subsequent Regulations also contains the details of the administration of fisheries in Oman, including the ability to license vessels and fishermen.

The Fisheries Law does not provide for the preparation of management plans for individual fisheries but are, in essence, more development-orientated and include details on the administration of fisheries.

Although the basic Fisheries Law is a relatively old piece of legislation, it has not yet been further reviewed or revised, apart from the issue of specific Resolutions and Decrees that define details of the Fisheries Law. However, the DGFR is currently⁴ preparing a draft of revised Executive Regulations.

STATUS OF THE FISHERIES

After reaching a peak of around 168 000 tonnes in 1988, the total landings of fish by both industrial and artisanal sectors in Oman subsequently declined and have remained relatively constant since about 1990 at approximately 120 000 tonnes per annum. However, the quality of the statistics upon which these landings are based has varied considerably during the past 20 years⁵, being relatively good during the period 1989-1995 and less reliable both before and after that period.

Following the major fisheries resources surveys carried out in the period 1975-1976 and 1983-1984⁶ by the R/V *Dr. Fridtjof Nansen* and the Regional Fisheries Survey (UN Programme) in the period 1976-1979 (Kesteven *et al*, 1981), a further comprehensive survey of Oman's fisheries resources was carried out at the request of the Ministry

³ Established in 1999.

⁴ As of late 2003, the draft Executive Regulations has included a review of the Fisheries Law and is nearing finalization.

⁵ This is primarily a result of two factors. First, the statistics collection apparatus has variously been within the DGFR (at which times, statistics quality is generally good) and within the overall Ministry's Statistics group (when fisheries statistics are less reliable, being collected by non-specialists in the field). Secondly, the input of various technical assistance programs, particularly USAID, has periodically re-vitalized the design of fisheries statistics collection.

⁶ Stromme (1986) and Stromme and Tilseth (1984).

of Agriculture and Fisheries in 1989-90. FAO executed the fish resources assessment survey project using the R/V *Rastrelliger*. The survey covered demersal fish resources, small pelagic fish resources and mesopelagic resources (lanternfish). The survey covered an area of 90 000 km² and all the EEZ of the Sultanate and included all depths from 15 to 200 meter. The survey did not cover the large pelagic fish resources, sharks, crustaceans, and molluscs.

The R/V *Rastrelliger* survey of 1989-1990 estimated the biomass of small pelagics as 252 000 tonnes (the *Fridtjof Nansen* survey estimated 600 000 tonnes). The greatest abundance was found to be in Masirah - Ras al Madrasah region (189 000 tonnes), and a lesser abundance in Muscat - Ras Al-Had (9 000 tonnes). The four small pelagic species mainly found in the Omani EEZ were Indian oil sardine (*Sardinella longiceps*), Indian scad (*Decapterus russelli*), horse mackerel (*Trachurus indicus*) and bigeye scad (*Selar crumenophthalmus*).

The R/V *Rastrelliger* survey estimated the demersal biomass over the entire Omani continental shelf area to be 565 000 tonnes, a figure about 36 percent higher than the previous estimates from the R/V. *Fridtjof Nansen* survey in 1983-84. Total potential yield of all species (commercial and non-commercial) was estimated to be 126 000 tonnes, of which 67 000 tonnes constituted the potential yield of the commercial fish species and 59 000 the potential yield for the non-commercial species. Of the 11 fish families of commercial interest, the most common species were the barracudas, croakers, emperors, groupers, grunts, jacks and scads, seabreams, snappers, threadfin breams, cuttlefish and ribbon fish.

The most abundant species in the non-commercial category were the rays, lizardfish, sea catfishes, gurnards, sharks and porcupine fishes, which accounted for about 36 percent of the total biomass. All these species, except the porcupine fishes, could have some commercial market value. With regard to distribution, 17 percent of the total biomass (96 000 tonnes) was distributed in the Gulf of Oman, while 83 percent (469 000 t) was found in the Arabian Sea.

The biomass of the mesopelagic fish (lanternfish) was estimated to be 4 490 000 tonnes, (4 000 000 tonnes in the Gulf of Oman and 490 000 tonnes in the Arabian Sea). Based on various assumptions, it has been estimated that the potential annual yield of the lanternfish stock could approach that of its standing stock biomass.

Although there have been attempts at capturing and processing the large stocks of deepwater lanternfish, this has not been successful and, to date, no commercial landings have been made. In 2003, however, the Iranian fishing industry established a fishery for lanternfish in Iranian waters in the Gulf of Oman and has successfully processed these into fish meal. Such developments may open this apparently large resource in Oman to exploitation.

In addition to the small pelagic, demersal and lanternfish stocks, Oman takes significant quantities of large pelagic species and high-value species such as abalone and lobster. Tuna catches in 2001 were around 20 000 tonnes (mostly yellowfin and longtail tuna) with kingfish (*Scomberomorus commersoni*) catches also being a significant 2 800 tonnes.

The resource surveys that have been undertaken have enabled the Government to express significant largesse in allocating quota to industrial fishing companies in an apparent effort to stimulate the development of the industry.

Current quota allocations to all industrial fishing companies is 28 000 tonnes of demersal species for the five companies with allocated quota and 75 500 tonnes of pelagic species (i.e. large pelagics) for the 11 companies with pelagic quota, a total of 103 500 tonnes. Of these quotas, Oman Fisheries Company (a joint Government/private sector company) holds 20 000 tonnes of demersal quota and 30 000 tonnes of pelagic quota.

In 2000, catches from the industrial trawlers were 10 682 tonnes with 1 720 tonnes being taken from the industrial longline fleet.

From both fleets in 2000, 8 872 tonnes of demersal species, 2 190 tonnes of large pelagics, 497 tonnes of small pelagics, and 517 tonnes of untargeted molluscs and crustaceans (all cuttlefish) were taken. This compares with 9 796 tonnes of demersals, 1 735 tonnes of cuttlefish, 629 tonnes of small pelagics, and 569 tonnes of large pelagics in 1999.

Total catches of demersal and large pelagic species from the industrial fishery in 2000 therefore represent approximately 10.7 percent of the allocated quota. Cuttlefish and small pelagics are not included in the quota arrangements. The remaining 89.3 percent of the industrial fisheries quota was not caught.

As a result of these extremely large industrial quota allocations (near to total current fisheries production of Oman), there may be major resource sustainability issues in the future if the industrial companies increased their fishing capacity to take their allocated quota each year or otherwise attempted to dispose of their quota allocation.

There have been concerns over many years regarding the status of the stocks of the rock lobster and abalone stocks and, to a lesser extent, the demersal resources, particularly cuttlefish. Rock lobster landings have decreased substantially to approximately 350 tonnes in 2001 from levels around 2 000 tonnes per annum in the late 1980s. This dramatic decline in landings paralleled similar major declines in landings of this species in Yemen at the same time. This collapse was attributed to the widespread use of nets rather than traps to capture lobsters (resulting in many undersized and egg-bearing animals to be taken) as well as increasing and unregulated fishing effort. Illegal entry of unregistered and unlicensed boats put further pressure on the stocks. Although landings have recovered a little in recent years, they remain 70-80 percent below earlier peaks with illegal fishing and export common. Enforcement capacity in the fishery remains inadequate although the DGFR, in recent years, has dedicated additional resources to this issue⁷.

Illegal catches of rock lobster in Oman are acknowledged to be large⁸ and the capture of undersized and egg-bearing lobsters is common. Catches outside the official two-month season of December/January each year are also common⁹.

However, the status of many of the stocks in Oman, despite several resource surveys, is uncertain, principally as a result of the lack of detailed and recent stock assessment and, more importantly, the lack of reliable statistics after about 1995. Adding to the lack of reliable landings statistics is the widespread illegal fishing and capture and illegal export of significant quantities of high-value rock lobster and other species.

The statistics collection procedures have, however, recently been upgraded and monitoring, control and surveillance activities have been improved. However, as welcome as these initiatives are, both surveillance activities (including prosecution) and the fisheries statistics collection system requires further major improvement if reliable assessments of key stocks are to be undertaken in the future.

A summary of the characteristics of the major industrial and artisanal fisheries in Oman in 2001 is given in Table 1. There are no significant recreational fisheries and no data are available.

MANAGEMENT ACTIVITY

With the development orientation for the fisheries sector, there is significant emphasis and budget expenditure on the provision of infrastructure facilities¹⁰ to the fishing

⁷ This includes an innovative partnership with Oman Fisheries Company whereby OFC provides border inspectors and facilities (under the auspices of the DGFR) and in return, is permitted to retain and process any seized illegal rock lobsters.

⁸ A 2002 estimate, made as part of a report to the DGFR, was that 850t of illegally caught Omani lobsters were exported (mainly to Dubai) annually. This is approximately three times the 'official' landings.

⁹ 'Fresh' Omani lobsters are openly marketed in the United Arab Emirates throughout the year.

¹⁰ This includes manpower development, through the DGFR-administered Youth Training Programme.

TABLE 1
Characteristics of the three largest fisheries (by volume) in Oman

Category of Fishery	Fishery	Volume (Est. in tonnes)	Value* US\$ million	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan?	# of Participants (Est.)	# of Vessels (Est.)
Industrial	1. Demersal trawl	10 682	16.7 ¹	86.1	68.7	No	391	13 ²
	2. Longline	1 720	7.6 ¹	13.9	31.3	No	509	18 ²
Artisanal	1. Coastal fishery	113 750	102.3	99.6	93.1	No	26 944	13 109
	2. Rock lobster	3 79 ³	4.3	0.3	3.9	No	Included in (1)	Included in (1)
	3. Abalone	51	3.3	0.1	3.0	No	Included in (1)	Included in (1)

* Estimated Value in 2002 U.S. Dollars.

1. Industrial fisheries value is export value, not legislated value for calculation of royalties.

2. Maximum number of vessels operating at one time during 2002. In previous years, the number of longliners in particular was significantly greater.

3. Does not include illegal catches which have been estimated to be three times these official landings (see footnote).

industry (primarily the artisanal sector) and rather less emphasis and expenditure on management activity for the existing fisheries. As an example, during the period of the Fourth Five Year Plan (1991-95), the Fishermen's Encouragement Fund approved 2 583 applications for boats, depth-finders, fish detection systems, communications and miscellaneous equipment. Almost 7 000 lobster pots were distributed free of charge and the DGFR's marine workshops along the coast continued to provide technical support, such as maintenance of fishing gear and servicing of outboard engines. This activity was further developed during the next Five Year Planning Period¹¹ when nine additional fishing harbors were constructed¹², a new fisheries research laboratory was opened at Port Salalah in 1998 and the extensive support and subsidization to the artisanal fleet was continued to allow further upgrading of vessels, Government-supplied fishing gear and training of fishermen.

Management regulations, however, are in place for both the industrial and artisanal fishery, although because of inadequate staffing¹³ for monitoring, control and surveillance activities, there is widespread illegal fishing in contravention of these management regulations¹⁴. These illegal activities are a particular problem in the artisanal fishery where many vessels and fishermen are unlicensed, gear size and type regulations are commonly ignored, and closed seasons (particularly for rock lobsters and abalone) widely disregarded. Illegal fishing activity is much less of a problem in the industrial fishery, partly because of the focus of MCS activities on this sector.

In general, the industrial sector, although small in comparison with the artisanal sector, is highly regulated¹⁵ whereas the artisanal sector is only lightly regulated. The principle regulations that are in force are:

¹¹ As part of the country's Economic Vision 2020, a growth rate of 5.6 per cent per annum to the year 2020 has been set for the fisheries sector.

¹² These harbors also included processing, cold storage and marketing facilities.

¹³ In 2002, there were 46 fisheries officers available to monitor and enforce management regulations in the industrial and artisanal fisheries, undertake factory and retail shop inspections, monitor border posts and inspect export shipments. Most MCS activity is directed to the industrial fishery. Support for these officers (vehicles, vessels etc) is extremely limited. Additional fisheries officers are, however, being recruited.

¹⁴ FAO are assisting the DGFR to address MCS issues in general, most particularly through the Fishcode project (FAO, 2000) and other activities.

¹⁵ This includes the use of VMS to monitor vessel locations, although catch reporting is not yet undertaken via the VMS.

Industrial sector

- Quota allocations for both demersal and pelagic resources¹⁶;
- Mesh size regulations for demersal trawlers of 210 mm in the wings and 110 mm in the cod end. Nets must be single layered;
- Area and operational restrictions¹⁷. Demersal trawling is restricted to areas between longitude 56 00 E and latitude 20 00 N, or in a depth exceeding 50 m. Large pelagic fishing vessels are restricted to areas between longitude 54 00 E and latitude 42 45 N, at a distance not less than 20 nautical miles from the coast. In addition, industrial fishing vessels must avoid fishing near fishing areas reserved for artisanal fishermen. No vessel is allowed to continue fishing operations in one section for more than five consecutive days. Distance between adjacent vessels during fishing operation should be at least five nautical miles;
- No fish discarding is allowed, although, in practice, a limited amount of discarding is permitted¹⁸;
- The maximum duration of any fishing trip is restricted to 35 days for demersal trawlers and 60 days for longline vessels; and
- One or more surveillance officer must be deployed onboard each fishing vessel for monitoring and surveillance purposes. However, in practice, this does not occur because of staffing shortages¹⁹.

Artisanal fisheries

There are no regulations controlling exploitation of small pelagic, large pelagic or demersal species (included the small shrimp fishery in the Gulf of Masirah) by artisanal fishermen, apart from the requirement for licensing of both vessel and fishermen. However, by supplying fishing gear such as nets etc, the DGFR is able to indirectly control gear specifications such as mesh sizes etc²⁰. For other fisheries, the following regulations are in place:

- It is only permitted to use traps for harvesting of lobster. Nets, spears or any other fishing gear are banned;
- It is prohibited to take egg-bearing females or young lobsters with a carapace length of less than 80 mm;
- Closed seasons from February to November each year (e.g. 10 months) for rock lobster and from 15 December to 14 October for abalone.
- Prohibition on throwing of any shark part or shark waste in the sea or on shore. The handling, marketing or exporting of any shark part is also prohibited unless a licence is obtained from the competent authority.

Stakeholder participation in the development and enforcement of fisheries policy and management measures is generally minimal at national level²¹ but more important at regional and village level.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The DGFR receives an annual budget allocation from the Ministry of Finance to fund its ongoing activities of fisheries administration, development, extension, licensing and surveillance. In addition, the two major funds of the Fishermen's Encouragement Fund

¹⁶ However, as noted above, the actual landings are only approximately 10 percent of allocated quota and hence companies never reach their quota limit. Low catch rates and the onset of monsoons in the south limits fishing activities long before quota limits are reached.

¹⁷ Summarized in al-Kharousi (2000).

¹⁸ This discarding of fish that are not suitable for sale is a contentious provision. Although discarding is officially forbidden, there is a policy of allowing a negotiated level of discarding for practical purposes.

¹⁹ In 2002, no observers were deployed on longline vessels although a near complete coverage of demersal trawlers was achieved.

²⁰ It is prohibited to import small mesh size nets into Oman.

²¹ However, the recent formation of Regional Fisheries Committees may enhance this participation.

(FEF) and the Fisheries Research Fund (FRF) are funded and administered separately. Infrastructure projects (such as harbour development, shore facilities etc) are funded as one-off items within the Ministry's and the Government's 5 year plans.

As an example, during the period 1996-2000, RO 84.1 million (US\$228.5 million) was allocated to investment in industrial and traditional fishing vessels, shore facilities and transport, RO 75 million (US\$203.8 million) for resources assessment and extension services, RO 25 million (US\$67.9 million) for harbor construction and RO 13.9 million (US\$37.8 million) for processing plants.

With the focus on identified development projects funded by central Government, the operational budget of the DGFR is limited. However, in addition to the annual budget allocation from the Ministry of Finance, the DGFR also receives funds from three other sources. First, 20 percent of fines (levied by the courts) for fisheries violations are returned to the DGFR to assist in funding fisheries surveillance activities. Secondly, the Government receives royalty payments from the industrial fishing fleet on a per kg of catch basis. Thirdly, fisheries license fees are paid directly to the DGFR although, since these are minimal and also widely ignored, the revenue from this source is small.

However, revenues from both fines and from royalties have been decreasing in recent years. Revenues from fines has reduced dramatically, from approximately OR500 000 (US\$1.35 million) in 1999 to OR200 000 (US\$0.5 million) in 2001, through a reduction in violations issued. This trend has continued into 2002²² and hence it may be expected that the reduction in funds available from this source will continue.

Likewise, revenues from royalties for industrial fishing have fallen as both catches have declined and also the species mix has changed. The fees paid for access to Oman's resources by industrial vessels are regulated by Article 11 of the Executive Regulations. These require that the fee paid be 12 percent of the values actually fished within the allocated quota.

Values (which are generally lower than actual values) are determined by this Article to be:

- OR250 per tonne for demersal fish
- OR200 per tonne ton for large pelagics
- OR100 per tonne for small pelagics
- OR500 per tonne for untargeted molluscs and crustaceans.

As noted above, total catches of demersal and large pelagic species from the industrial fishery in 2000 were, at 12,076 tonnes, approximately 10.7 tonnes of the allocated quota. Cuttlefish and small pelagics are not included in the quota arrangements.

Royalty revenues from these catches were as shown in Table 2.

As a comparison, the calculated royalties under the same arrangements in 1995 were OR922 026. This represents a decline in royalties of over 61 per cent since 1995 and 15 percent between 1999 and 2000 alone. In addition, and contributing to the decline in royalties, is the precipitous decline in cuttlefish catches.

Because of the pressure on revenues, the DGFR's activities in recent years have been limited to maintaining basic services.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Oman ratified the UN Convention on the Law of the Sea (UNCLOS) in 1989 but has not yet ratified the UN Fish Stocks Agreement or the UN Compliance Agreement.

Oman has introduced regulations to curb the trade in shark fins but has not yet implemented the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, or seabird by-catch in longline fisheries. As a result, no national plans of action for any of these issues are incorporated into national legislation.

²² Up to June 2002, the last month for which data is available, no violations had been issued.

PARTICIPATION IN REGIONAL FISHERY BODIES

Oman is an active member of the Indian Ocean Tuna Commission, the Convention on the Regional Protection of the Marine Environment (ROPME) and the Regional Fisheries Commission (RECOFI).

National legislation does not require that regional fisheries issues are considered in either making management decisions for highly migratory and straddling stocks or in other fisheries management matters.

SUMMARY AND CONCLUSIONS

The fisheries sector has traditionally been, and continues to be, an important part of the economy of Oman, contributing around 1 percent of GDP with plans to increase this to 2 percent by 2020. The sector is a major employer in rural areas (directly employing over 50 000 people) where there are few other employment opportunities. The fisheries have been, and continue to be, based on significant stocks of pelagic and demersal species, including high-value species such as lobster and cuttlefish, and, as a consequence, Oman is one of the largest fish producers in the region and a net exporter of fish and fish products.

Oman has pursued a policy of developing the artisanal sector through substantial expenditure on infrastructure, direct grants, subsidies, free provision of fishing gear, training and subsidized services such as engine and vessel upgrading and repair. At the same time, it has encouraged the development of an industrial fisheries sector by allocating generous quotas of demersal and large pelagic stocks to selected companies in Oman²³, including the part Government-owned Oman Fisheries Company. While this development thrust was being pursued, it is apparent in hindsight that the development objectives did not always match the sometimes optimistic estimates of sustainable yields from the fisheries. As an example, the industrial fisheries have been the beneficiary of Government grants of demersal and large pelagic quota totaling 103 500 tonnes (consisting of 28 000 tonnes of demersal quota and 75 500 tonnes of large pelagic quota) which is near to the total recent annual fisheries production for all species in Oman. Current industrial fisheries only take about 10 percent of their allocated quota each year before low catch rates and monsoonal weather in southern regions result in their ceasing fishing activities.

While Oman has also been active in setting up and funding infrastructure that can support fisheries management activities, such as a dedicated research institute, a statistics collection system and a monitoring, control and surveillance capability, the expenditure on such infrastructure has been low in comparison to more development-orientated activities. As a result, and despite these excellent facilities, there is insufficient information on the status of key fish stocks in Oman on which to base long-term management plans, monitoring, control and surveillance activities are under-funded and therefore not capable of adequately enforcing management regulations and basic landings and fishing capacity statistics are not as reliable as in the past.

Industrial fisheries have traditionally been heavily regulated in Oman²⁴ while the much larger artisanal fisheries have been lightly regulated. This is partly a response to the difficulties of developing and enforcing any regulations in a fishery that is small-scale, is geographically widespread and, most importantly, remains more connected to regional, tribal and village level administrators than to a distant, centralized management agency in Muscat.

²³ Many of these companies have become publicly listed companies, attracting private sector (and often speculative) investment.

²⁴ However, the effectiveness of such regulations is questionable because of under-funding of MCS activities.

However, with total landings stagnating (and, for many important fisheries such as rock lobsters and cuttlefish, declining precipitously), catch rates declining and fishing effort apparently rising²⁵ as a result of the increased efficiency of the artisanal fishery (a result of Government support and subsidies over several decades), the issue of effective regulation of the artisanal sector needs urgent attention. The DGFR is aware of, and is addressing, this difficult issue.

Oman possesses well documented, major resources of mesopelagic fish, with standing biomass being estimated at over 4.5 million tonnes (Scharfe, 1983). However, despite several attempts, the commercialization of these resources has proven difficult. If the technical barriers to capture and commercialization can be overcome, these resources could, potentially, add significantly to Oman's annual fish landings.

While Oman has taken significant and important steps in addressing fisheries management policy issues, there remains much to be done. Stock assessments of the major commercial fish stocks need to be undertaken or upgraded to provide the basis for their management, monitoring, control and surveillance activities need to be upgraded to deter the presently common illegal fishing (particularly in the artisanal sector) and management of transboundary stocks (particularly the important large and small pelagic species) needs to be increasingly seen within a regional context. If these reforms in fisheries management can be achieved, the fisheries of Oman can continue to be a major contributor to the country's economy and to regional fisheries production.

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²⁵ However, there are no reliable statistics collected on fishing effort or fishing capacity.

APPENDIX TABLES

Current Management of Marine Capture Fisheries in Oman

Level of Management	% Fisheries Managed ¹	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	20	nil	20	Unchanged
Regional	n.a.	nil		n.a.
Local	n.a.	nil	n/a	n.a.

1. 'Managed' is taken to mean significant management intervention by Government or others. All fishermen and fishing vessels are required to be licensed but this, by itself, is not considered 'managed'.

n.a. = not available

Use of Fishery Management Tools within the three largest fisheries in Oman

Category of Fishery	Fishery	Restrictions				License Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1. Demersal trawl	Yes	No	Yes	No	Yes	Yes ¹	No	Yes	No
	2. Longline	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No
Artisanal	1. Demersal & pelagic	No	No	No	No	Yes	No	No	No	No
	2. Rock lobster	No	Yes	Yes	Yes	Yes	No	No	No	No
	3. Abalone	No	Yes	No	No	Yes	No	No	No	No
Recreational	No significant recreational fisheries	No	No	No	No	No	No	No	No	No

1. Catch restrictions relate to the prohibition on discarding 'trash' or unwanted fish.

Costs and Funding Sources of Fisheries Management within the three largest fisheries of Oman

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries ¹	Resource rents
Industrial	1. Demersal trawl	Yes	Yes	Yes	No	Yes	No
	2. Longline	Yes	Yes	Yes	No	Yes	No
Artisanal	1. Demersal & pelagic	Yes	Yes	Yes	No	Yes	No
	2. Rock lobster	Yes	Yes	Yes	No	Yes	No
	3. Abalone	Yes	Yes	Yes	No	Yes	No
Recreational	No significant recreational fisheries	No	Yes	Yes	No	Yes	No

1. License fees, and other fisheries-related revenue, are paid to the DGFR. Management funding is then sourced from the total annual budget allocations to the DGFR. There is no specific link between the revenues collected for any fishery and the budget allocation for management of that fishery.

Compliance and Enforcement within the three largest fisheries in Oman

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1. Demersal trawl	Yes	Yes	Yes	Yes	No	
	2. Longline	Yes	Yes	Yes	Yes	No	
Artisanal	1. Demersal & pelagic	No	No	Yes	Yes	No	
	2. Rock lobster	No	No	Yes	Yes	No	
	3. Abalone	No	No	Yes	Yes	No	
Recreational	No significant recreational fisheries	No	No	No	No	No	

Capacity Management within the three largest fisheries in Oman

Category of Fishery	Fishery	Does overfishing exist? ¹	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1. Demersal trawl	Yes	No	Decreasing	No	
	2. Longline	Yes	No	Decreasing	No	
Artisanal	1. Demersal & pelagic	Yes	No	Decreasing	No	
	2. Rock lobster	Yes	No	Decreasing	No	
	3. Abalone	Yes	No	Decreasing	No	
Recreational	No significant recreational fisheries	No	No	No data	No	

1. Because there are few, if any, stock assessments of major fish stocks, the responses are the author's opinions, based on published information and consensus of national and foreign scientists.

Country review: Pakistan

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June 2004

INTRODUCTION

The marine fisheries industry of Pakistan started virtually from scratch at the time of independence in 1947. It was then based entirely on a small-scale fishery. A single rundown fish trawler was inherited by Pakistan at that time as its share of the partition of the resources of the fisheries industry of the subcontinent, no fish harbour and fish processing plant was present (Qureshi, 1961). A fish harbour was later constructed at Karachi in 1958. Subsequently the fishing fleet of the country grew considerably and has now become mechanized to a large extent. The fish production has also increased to about 522 200 metric tons of which 26 000 metric tons are composed of shrimps.

Fishery plays an important role in the national economy. It provides employment to about 379 000 fishermen directly. In addition, another 400 000 people are employed in ancillary industries. It is also a major source of export earning. In 2002, fish and fishery products valued at US\$ 118.6 million were exported from Pakistan.

This review of marine capture fisheries management in the Islamic Republic of Pakistan is a component of the FAO's project on the state of the world marine capture fisheries management. The overall goal of the project is to provide an informative reference to decision makers, fishery managers, and stakeholders.

Information in this review is obtained from a variety of sources, including fisheries management institutions, annual reports, other relevant documentations etc. The Pakistan country profile and management brief on the FAO website (prepared by the author) provides additional information.

POLICY FRAMEWORK

The objectives of fisheries management in Pakistan vary considerably are depending on the level of government. In Pakistan there are three levels, which have special significance for fisheries management.

- **Federal government** has jurisdiction over fisheries management in the zone between the territorial waters base line and the outermost limits of the exclusive economic zone (EEZ).
- **Provincial governments;** the two provinces (Sindh and Baluchistan) have jurisdiction over fisheries management in the waters in their respective territorial waters (12 mile zone). Each province has its own administrative set-up. In addition, several other agencies involved in fisheries and have own plans for fisheries development and management.

The marine fisheries policies of developing countries such as Pakistan are generally directed towards the achievement of four objectives, namely: bridging the protein gaps as to enhance the supplies of marine fish for domestic consumption, to generate employment, to improve the economic well-being of the fishermen and to earn more foreign exchange through the export of fish and shellfish. In Pakistan maximum attention is being paid to achieve the last objective, that is, the earning of foreign exchange, which has developed the marine fisheries industry as an export-oriented one.

The general fisheries policy is aimed for rational use of marine resources and maximizing of economic benefits. Several strategic documents for national fisheries

development have been prepared by government agencies but there is no special document adopted at the federal and provincial levels which would set objectives of fisheries management policy in the country.

At Federal government level, the objectives of the marine fisheries policy are enunciated as: training of fishermen, improvement of fishing boats, modernization of infrastructure facilities, conservation of shrimps and other fish resources, extension of fishing operations to the entire EEZ, initiation of fish and shrimp culture and checking of marine pollution. The common objectives at provincial government level appear to be prevention of destructive fishing, deterring overfishing and protection of endangered species. The objectives of management at the local government level mainly revolve around assuring the sustainability of local marine foods.

In practical terms, the Federal government manages the industrial deep sea fisheries (demersal and large pelagic), in which all of the participating vessels are from distance water fishing nations, particularly China and South Korea.

LEGAL FRAMEWORK

According to the constitution, the management of marine fisheries is a federal responsibility outside the limit of territorial waters (12 nautical miles). The Ministry of Food, Agriculture and Livestock (MINFAL) is the Federal Agency responsible for fisheries. Marine Fisheries Department (MFD) is the executive fishery agency of the federal Government, with primary responsibilities for ensuring management and development of fishery resources in the interest of the nation. Federal government has passed following acts, presidential proclamations, rules and regulations so far.

- The constitution of Pakistan, Fourth Schedule, Article 70(6): Gazette of Pakistan, Extra, April 12, 1973.
- The Presidential Proclamation of March 20, 1973; Gazette of Pakistan, March 20, 1973.
- The Exclusive Fishery Zone (Regulation of Fishing) Act; Act No.XXXII of 1975 as amended in 1993.
- The Territorial waters and Maritime Zone Act, 1976; Act No.LXXXII of 1976.
- The Exclusive Fishing Zone (Regulation of Fishing) Rules 1976, promulgated under section 16 of the Exclusive Fishing Zone (Regulation of Fishing) Act 1975.

The Exclusive Fishery Zone Act of 1975 provides for penalties nor exceeding Rs.5,000/- and confiscation of, and possible sale, of the catch in the case of violations. Violations of the Territorial Waters and Marine Time Zones Act of 1976 are punishable by a three year imprisonment. Appleyard *et al.* (1981) mention that both provisions, that is, a fine of Rs.5000/- and confiscations of the catch are insufficient deterrents for violators. In the present deep sea fishing policy, these penalties has been enhanced by several folds (Box-1) to make them effective and vessel monitoring system has been established to watch the activities of these industrial fishing vessel by 24 hours.

On the provincial level, the Government of Sindh have framed and promulgated the Sindh Fisheries Rules of 1983 in exercise of the powers conferred by Section 27 of the Sindh Fisheries Ordinance, 1980. From the standpoint of marine fisheries the following provisions of the rules are important.

- 9(1): No licensee or lessee of fishing rights shall obstruct or cause to obstruct, migration or movement of palla (*Hilsa* sp.) fish towards upstream, by using or setting up any kind of set net or any type of fixed engine or device at or near the mouth of the Indus or its branches at any place up to Sachanwari landing centre throughout the year.
- 9 (3): No person shall collect, sell or culture oysters within the creeks and the Indus River delta without obtaining a special permission from the Director on such conditions as are specified in the permission.

- 20 (1): Shrimps shall be packed in fish processing plants in approved packing material in uniform size, colour and shapes, and soft or spotted, shelled or spoiled shrimps shall not be packed at all.
- 20 (2): Shrimps shall be frozen at minus 40° C for suitable time to attain 0° C temperature in the centre of the body but no undue pressure shall be applied on the packages while freezing.

The Baluchistan Fisheries Ordinance of 1970 provides another example of fisheries legislation in Pakistan. The ordinance was passed by the Government of Baluchistan to: i). protect the fishing interests of the much less mechanized fishing fleet of this province, ii) to grant curing yard licenses and iii) to issue certificates of quality for processed and unprocessed fish for domestic consumption, inter-provincial trade and for export (FAO, 1977). According to this ordinance the much advanced fishing trawlers based in Karachi are forbidden from fishing within the 3-mile inshore waters of this province. Great hue and cry was raised in the year 1984 by trawler owners on the coast of Karachi and Sindh against this ordinance on the plea that they should not be discriminated against now that the fishing crafts of the coast of Baluchistan have become mechanized to a great extent.

The Baluchistan Sea Fisheries Act No. IX 1971 provides authority of fishing crafts, fishing license and processing of fish and fishery products in the territorial water of Pakistan along the coast of Baluchistan. Contravention of any provision of the Ordinance is punishable by one-month imprisonment or with a 5 000/- rupee fine or both.

The objectives of fisheries management at levels of provincial government are not as well articulated and therefore must be inferred from content. The common objective appears to be prevention of destructive fishing, deterring of over-harvesting and protection of endangered species.

STATUS OF FISHERIES

The annual fish statistics has been reviewed by Garibaldi (2002) and Khan (2002). They examined the capture fishery statistics of the country as a whole, it was noted that catches have more than tripled during last three decades (173 500 metric tons in 1970 to 614 829 metric tons in 2001) with an average growth rate of 7.9 percent per year. There is significant increase in the landing during 1973, 1977-79, 1992-93 and 1999-2000. The peak during 1973 may be due to the fact that more landings were recorded. The peak during 1977-79 may be as a result of exploratory fishing, which provides information on new fishing grounds. The peaks during 1992-93 and 1999-2000 are the result of extensive fishing by longliners and deep sea trawlers (Khan, 2002).

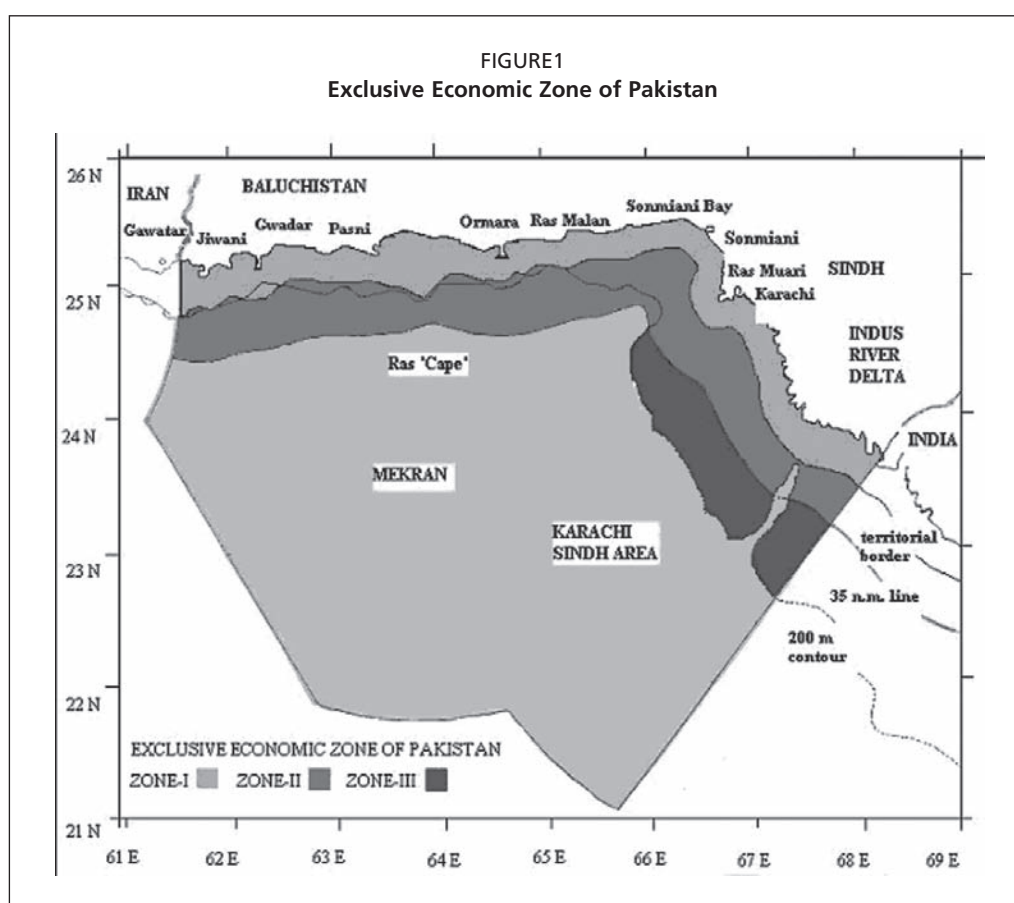
The total landing of marine sector increases from 147 269 metric tons to 427 582 metric tons with an average growth rate of 5.9 percent during the same period. There is significant increase in the landing during 1973, 1977-79, 1992-93 and 1999-2000 similar to that total fish landing. These increases attributed towards the development of infrastructure, exploratory fishing surveys and introduction of modern fishing technology in marine fisheries sector (Khan, 2002). Now traditional fish resources were reached at their maximum and any significant increase in fish production from marine sector depends on the use of modern fishing technology. With the present artisanal fishing boats and gears, we cannot harvest as much fish to meet the requirements of animal protein for human population in the future (Khan *et al.*, 2003).

The total fish production of both marine and inland fish during the period from 1996 to 2002 showed that total production increased from 589 731 metric tons in 1997 to 654 530 metric tons in 1999 thereafter it is decreasing. It decreased up to 522 207 metric tons during 2002 (Table-1). The productions from marine and inland have similar trends as that of total production. The production in marine sector increased from 422 201 metric tons in 1997 to 474 665 metric tons in 1999. It decreased up to

TABLE 1
Fish production in Pakistan

	Quantity in Metric tons					
	1997	1998	1999	2000	2001	2002 ¹
TOTAL PAKISTAN	589 731	596 980	654 530	614 824	555 125	522 207
MARINE	422 201	433 456	474 665	438 361	401 818	382 409
Sindh	285 767	295 648	333 047	294 400	278 476	255 359
Balochistan	130 406	130 799	123 073	129 686	123 342	122 780
EEZ	6 028	7 009	18 545	14 275	-	4 270
INLAND	167 530	163 524	179 865	176 463	153 307	139 798

1. Estimated production.



382 409 metric tons during 2002. The production from inland sector increased from 167 530 in 1997 to 179 463 metric tons in 1999 and decreased up to 139 798 metric tons during 2002.

During the year 2002, out of total production of 522 207 metric tons, 382 409 metric tons of fish was contributed by marine sector (73.2 percent), whereas contribution of inland sector was 39 798 metric tons (26.8 percent). In marine sector, out of total production of 382 409 metric tons, 255 359 metric tons (66.8 percent) was contributed by Sindh coast, whereas that of Baluchistan was 122 780 metric tons (32.1 percent) and the contribution from EEZ was 4 270 metric tons (1.1 per cent) respectively.

The marine capture fisheries can be divided into three main types, coastal or inshore fisheries of Sindh and Baluchistan, artisanal offshore fisheries and deep-sea fisheries. The **coastal or inshore fisheries** operate from within the shoreline to 12 nautical

miles (Zone-1 of Fig.1) and are important socio-economic activity of the coastal areas particularly in Baluchistan province. The fishing vessels ranges from traditional wooden boats ranges between 12-15 meters using 16 HP out-board engine and operating in shallow waters of zone-1. Provincial fisheries department of Sindh and Baluchistan manage them. The coastal fishery of Sindh is totally dependent on shrimp resources whereas in Baluchistan it depends on small pelagic resources. Offshore fisheries depend on tuna or other large pelagic fish species. These fishing boats are using gillnet and sometimes longlines.

Shrimp forms most important fishery in Pakistan because of its high foreign exchange earnings and the employment it generates. It is carried out in shallow waters from October to March, while in July, August and September shrimps and prawns are caught in creeks and brackish waters. It is then processed as frozen for export to USA and European markets. At least 21 species have been reported from Pakistan's waters (Ahmed, 1977). 15 shrimp species occur regularly in varying numbers in the commercial landings, but five or six species make up for the bulk of them (van Zalinge *et al.* 1987). These are: *Penaeus merguensis*, *Penaeus penicillatus*, *Penaeus indicus*, *Penaeus monodon*, *Penaeus semisulcatus*, *Penaeus japonicus*, *Metapenaeus affinis*, *Metapenaeus monoceros*, *Metapenaeus brevicornis*, *Metapenaeus stebingii*, *Parapenaeopsis stylifera*, *Parapenaeopsis sculptilis*, *Parapenaeopsis hardwickii* and *Metapenaeopsis stridulans*.

The commercial shrimp trawling started in 1958, after the Central Fisheries Department (Presently Marine Fisheries Department) on recommendation from FAO, introduced mechanization of larger fishing craft in 1956. Trawl net consists of cone-shaped body, closed by a bag extended at the opening by wings. The trawl net is locally constructed from imported nylon webbings and is called, "gujjo". A typical trawl net is operated with 120 hp engine. The net has a circumference of 860 meshes by 50 mm. stretched mesh with the cod-end of 25 mm. stretched mesh. The horizontal opening is obtained by otter boards made up of wood with iron shoes. Lower edge of the net opening is normally protected by a thick nylon ground rope ballasted with lead snickers. Other gears, like cast-nets, entangle nets, barrier traps etc. continued to be utilized particularly in the Baluchistan coastal areas and the Indus delta creeks. These shrimp trawler are operating only in Sindh coastal areas, whereas in Baluchistan, shrimp trawling is prohibited.

After the introduction of mechanization, trawler fleet rapidly expanded from three vessels in actual operation in 1958, to 450 in 1970, 890 in 1980, and 1 400 in 1990 to 2 353 in 2000 respectively. In 2002, 2 580 shrimp trawlers are in actual operation. These trawlers have contributed 22 377 tonnes of shrimp to marine landing in 2002.

Gillnet is another important fishing gear used by coastal or inshore wooden gill-netters. It is made up of nylon twine with the stretched mesh size of 150 mm. Gillnet is locally known as "RUCH" and is being operated all along the coast. The total length of gillnet is between 2.5 to 5 km and 80 meshes deep. The net may be used to fish in mid-water or on the bottom by changing its blasting and buoyancy. Usually, the fishermen shoot their nets in the evening and retrieve in the next morning mainly targeting the higher-valued commercial pelagic fish species. However, the set gillnets are also used by the coastal fishermen for catching demersal fish species like marine jewfish, croakers, grunters, snappers, groupers, ribbonfish, Pomfrets etc.

Small pelagic fish resources are being caught in coastal waters of Sindh by using surrounding nets locally known as "KATRA", hence the fishery called katra fishery. Fishing operations are conducted with the wooden boat called "HORA" (boat with both ends pointed with very broad beam and using 1-2 long shaft outboard engines) in the depths lower than 20 m, where good concentration of clupeids especially Indian Oil Sardine exists in the form of scattered shoals. Majority of Katra boats are based at Ibrahim Hydri, Chashma Goth, Shamspari Baba Island fishing villages. Peak season is October to November and February to April. The catches are exclusively used for

production of fishmeal. The duration of fishing trip is 14-16 hours. No chilling or other preservation is available onboard.

Katra nets are similar to surrounding nets, with the length ranging from 150 m to 200 m and depth 24 m to 30.6 meter, respectively. The bunt, where catch retains, lies in the middle of two lateral wings. After encircling the fish schools the footrope of Katra net is hauled-in from both wings at the same time, as such no purse line is used to enable the net to be closed like purse as done in the modern purse-seiners. However, extension rope attached to the middle of the bunt assists in hauling operations. The net is constructed with Polyamide webbings having 12 mm mesh size (stretched) in the bunt and 15 mm stretched mesh in lateral wings.

Deep sea fishery or industrial fishing, Pakistan being a coastal state declared its exclusive economic zone (EEZ) beyond territorial waters up to 200 nautical miles. These zones remained completely un-exploited and its fishery resources were untapped, because fishing activities of local fishermen were largely confined within the territorial waters by employing traditional and indigenous fishing boats. These boats whether mechanized or non-mechanized trawlers or gillnetters, are small in size and not equipped with navigation facilities, electronic fish finding equipments, mechanically operated fishing gears etc. In order to exploit the resources available in the EEZ, the Government of Pakistan has allowed operation of foreign flag deep sea fishing trawlers of 300-350 GRT under joint venture scheme in 1982 (Box-1). These trawlers were allowed to fish beyond 35 nautical miles in EEZ. A 10 percent royalty was also charged on the fish caught by these trawlers. Joint venture fishing scheme by foreign flag vessels was stopped in 1986 and since then only under Pak-flag are allowed to operate in the EEZ of Pakistan for these deep sea demersal fish resources by paying fixed royalty and annual license fee.

The deep sea fishing under joint ventures is a source of controversy ever since its initiation. Fishing by contract vessels has created a number of problems for local inshore fishermen. The foreign vessels have been accused of fishing illegally in the shallow waters and of transferring, wholly or partially, their catch in the high seas and reporting low catches. Occasionally the Pakistan Coast Guards and Pakistan Navy have located unauthorized foreign fishing vessels (on contract) in the inshore areas. These vessels are known to have caused damage to the fishing gears and fishing crafts of Pakistani fishermen engaged in shallow water fishing for shrimps and inshore finfish.

Fisheries as a sub-sector of agriculture, contributes on an average about 1.0 percent to the total GDP, this amounts to about 4.0 percent of the GDP of the agriculture sector. The major fisheries of the country can be summarized as:

TABLE 2
Characteristics of the major fisheries of Pakistan

	Gross landings of catch (mt)	Gross Value of catch (US\$ million equivalent)	Year (Value, landings)
Shrimp fishery	22 377	105.0	2002
Artisanal tuna fishery	34 917	27.1	2002
Industrial deep sea fishery	4 270	3.8	2002
Artisanal gillnet fishery	270 893	327.0	2002
Small pelagic fishery	84 294	7.3	2002

FISHERIES MANAGEMENT ACTIVITY

How are management measures developed and implemented?

For sustainable development and management of marine fisheries resources in EEZ of the country outside territorial waters, Federal Government promulgated the Exclusive Fishing Zone (Regulation of Fishing) Act, 1975. Pakistan also adheres to the guidelines and Code of Conduct for Responsible Fisheries as laid down by the FAO of the United Nations (Raza and Wasim, 2003). Federal government has taken some specific

management measures to combat illegal, unregulated and unreported (IUU) fishing in EEZ of the country, which are:

- installation of global positioning system (GPS);
- strengthening of VMS system;
- enhancement of penalties for violation of any provision of the fishing act.

Exclusive Fishery Zone (Regulation of Fishing) Act 1975, also have following other specific management measures:

- Under section 5, use of dynamite or any other explosive substance or poison for fishing is prohibited.
- S.R.O. 329(1): The period commencing first June and ending July is to be the period during which and the entire area of the zone within which catching of shrimps shall be prohibited.
- S. R. O. 332(1)/79: Catching of berried lobsters prohibited. No holder of a license, fishing permit or identity card shall engage himself in catching female lobsters loaded with eggs (berried lobsters) and lobsters of 15 cm or under caught; such lobsters shall be immediately released back into the sea alive and shall not be landed or marketed. Explanations: - For the purpose of this rule, the length of the lobsters shall be measured from the middle of the curve between orbital spines to the tip of the telson.

Stakeholders are not involved in management process since there is no legal basis; however they influence fisheries management indirectly. The provincial fisheries Directorates collect data on the coastal and offshore fisheries and apply to the local fish stock protection measures.

How many fisheries and exploited stocks in the country are managed?

Formally all fisheries for stocks may be considered as the managed ones. At least, stock assessment is somehow conducted, the allowable catch is somehow determined and when issuing licence or fishing permit, the gear and whether a particular species is targeted is considered. From the less stand point, real management at the stock level is not the case. Nearly all exploited fish stocks in offshore and coastal waters are under management.

Changes in the number of managed fisheries

The number of managed fisheries is somewhat increasing year after year because targeted fishing is now being started and management measures are developed. This formal increase of the fish stocks of small pelagic, particularly Indian mackerel was seen in the coastal areas. The reason for this is a high demand for low priced small pelagic in Far East countries.

What factors drove changes in the management actions, measures and/or mechanisms adopted?

The driven force in changes in the management actions and/or mechanisms is usually catch statistics of particular exploited stocks. The economic role and dependence of the domestic economy on particular fisheries is another factor driving changes in the management approach at the regional level.

Regularity of the stock assessment

Shrimp forms the backbone of the fish industry in the country and is regularly being monitored by using catch and effort data. In 1971, Marine Fisheries Department in collaboration of FAO had carried out first study regarding estimation of maximum sustainable yield (MSY) by using catch and effort data. In that study, data of total shrimp landings for the period 1959-1970 were analyzed by Zupanovic (1971). Whereas van Zalinge *et al.* (1986, 1987) analyzed the data of prime species for the period 1970-

1982. According to the latter study maximum sustainable yield of prime species of shrimps i.e. Jaira (*Penaeus* sp.) and Kalri (*Metapenaeus* sp.) lies between 16 000 to 17 000 metric tons, which is exploitable by 550 to 600 trawlers. Whereas MSY of Kiddi (*Parapeneopsis* sp.), the smallest trade category of shrimp, lies between 16 000 to 18 000 metric tons exploitable by maximum effort level of 500 to 750 shrimp trawlers (Khan, 1993). If we combine all the estimates of MSY, then total MSY would be between 32 000 to 37 000 metric tons and exploited by 500 to 600 boats which is some how higher than the estimated MSY of 25 000 metric tons as reported by Zupanovic (1971). This might be due to the fact that at present fishing is being carried out deeper than that of in the past (in early seventies).

Tuna fishery in Pakistan is an artisanal activity with marginal inputs from industrial sector. As a part of national policy, for the judicious exploitation of fishery resources in Exclusive Economic Zone (EEZ) of Pakistan, further emphasis is being given for development of tuna fisheries both in coastal waters as well as on the high seas. These fishes are incidentally caught by pelagic gillnetters, targeting on a number of mixed species, especially the more lucrative ones such as mackerels and sharks, which fetch better prices in local market. Therefore the fishery is generally confined to the areas where most of these fishes occur and not specifically in areas where only tunas are in abundance. In addition to this artisanal fishery, in 1990 Government of Pakistan had permitted foreign flag tuna longliners of 500-750 GRT for the purpose of resource survey and stock assessment as well as commercial exploitation. These tuna longliners were allowed to operate in EEZ of Pakistan beyond 35 nautical miles from the coastline by paying license fee and 3 per cent royalty on the incidental catch. Stock assessment programme by foreign flag tuna longliners was stopped in 1995, since then only Pak-flag tuna longliners are allowed to operate in EEZ of the country for tuna and other large pelagic fish resources by paying fixed royalty and annual license fee.

In order to provide realistic management advice for tuna fishery based on up-to-date data assessment, a stratified sampling scheme was set-up at KFH in 1986 in collaboration with Indo-Pacific Tuna Programme, to collect reliable information on the landing of tuna and allied species. The estimated annual landings as computed through the stratified tuna sampling programme indicated that there are good tuna resources which required sound policy for the development of tuna fishery in the country. Species composition of the tuna catches has shown that considerable landings of oceanic species such as yellowfin and skipjack is taking place by the small scale sector, employing traditional craft and gear, whose effort are confined to the coastal waters. This can perhaps be attributed to the fact that continental shelf along Baluchistan coast is very narrow (15-30 km) and deep waters run very near to the shore resulting in relatively high landings of the oceanic species from coastal waters.

Since tunas are highly migratory species and constitute a shared stock, there is a need of a common strategy to be devised jointly for Indo-Pacific Tuna fishery by the regional neighbouring countries to see that the stocks are not over exploited in any one of the regions, which may affect the share of the neighbouring country. Each member country of the region must take due care to avoid inevitable damage to these stocks. Appleyard *et al.* (1981) opined that it might be advantageous to exploit the Arabian Sea tuna by Pakistan and neighbouring coastal countries on a joint venture basis.

In the past 40 years a number of surveys have been made in Pakistan's waters, including its Exclusive Economic Zone (EEZ). However, most of these were of an exploratory nature, looking for new fishing grounds with commercial applications without aiming at an accurate assessment of the fish stocks which at that time were assumed to be un or under-exploited.

The first exploratory survey was started in 1948 by the wooden trawler named "ALA". Whereas extensive exploratory survey was carried out in 1960 by former "Machhera" shrimp trawler. Another commercial shrimp trawler "Machhranga" also

conducted survey during the years 1966-69. On the basis of above data Zupanovic and Mohiuddin (1973) estimated the demersal fish stocks over Pakistan's shelf. The trawl stations were not chosen randomly but their positions determined by ecosounders for the better results. The biomass estimates were 45 000 metric tons for the coastal zone (5 to 50 meters depth) and for the offshore zone (20-200 meters) 92 000 metric tons.

Most of biomass estimates of demersal fish in Pakistan waters have been based on survey activities of the Norwegian research vessel *Dr. Fridtjof Nansen*, the USSR research vessel "*Nauka*", and MFD's two research vessels "*Machhera*" and "*Tebkik*". The Norwegian vessel surveys took place in 1975 to 1977 and in 1983 and 1984. Survey methods included assessment of fish stocks by acoustics, supported by some exploratory trawl fishing. In 1984 the vessel also executed a number of randomly distributed trawls. The acoustic surveys yielded biomass estimates ranging from 62 000 to 600 000 metric tons for different time period/area combinations. The biomass estimate from the random trawl survey was 257 600 metric tons. Both surveys covered the shelf area deeper than 15 meters.

R/V "*Nauka*" carried out an intensive trawl survey in Pakistan's EEZ in 1969. The Pakistan research vessel *Machhera* carried out trawl surveys in shallow waters (5-55 m depth) during 1960 to 1967 and in offshore waters (45-125 m) in 1969. The data from the above surveys were re-analyzed by Appleyard, *et al.* (1981) yielding estimates of demersal fish biomass on the continental shelf between the shore and 200 m depth of 504 400 metric tons based on "*Dr. Fridtjof Nansen*" surveys, and 682 500 metric tons based on "*Nauka*" surveys.

The Marine Fisheries Department in collaboration with FAO also conducted surveys during the period 1983-90, using the research vessels "*Machhera*" and "*Tebkik*". For the first time an attempt was made to use a statistically acceptable approach for stock assessment. The survey was conducted on the continental shelf between 10 and 200 meter depth. The survey yielded demersal fish biomass estimates ranging from 241 000 to 343 500 metric tons (Abilgaard *et al.* 1986).

Brandhorst (1986) noted that the early surveys were exploratory in nature and did not give reliable estimates of the demersal fish resources. By comparison, he considered the MFD-FAO estimates more reliable and tendered a total demersal fish biomass estimate of about 330 000 metric tons for the shelf area between 10 and 200 m depth. There is no data base for calculating the biomass of the zone inshore of the 10 meters isobath, area which was estimated at 6 476 sq. km, and the zone of back waters, estuaries, mangrove swamps, canal which are estimated at 3 850 sq. km. He assumed that fish density in these two zones is double as compared to the surveyed area. In this way, he added biomass of 100 000 and 57 750 metric tons in the surveyed area thus bringing the total demersal fish biomass of 500 000 metric tons for the entire shelf area.

Recently Garibaldi (2002) and Khan (2002) have reviewed the fisheries statistics for the period 1970-2001. They have examined the capture fishery statistics of the country as a whole, it was noted that catches have more than tripled during last three decades (173 500 metric tons in 1970 to 614 829 metric tons in 2001) with an average growth rate of 7.9 per cent per year. There is significant increase in the landing during 1973, 1977-79, 1992-93 and 1999-2000. The peak during 1973 may be due to the fact that more landings were recorded. The peak during 1977-79 may be as a result of exploratory fishing, which provides information on new fishing grounds. The peaks during 1992-93 and 1999-2000 are the result of extensive fishing by longliners and deep sea trawlers (Khan, 2002).

Since all the demersal finfish biomass estimates have some shortcomings, few were based on statistically acceptable survey methods but they did not cover the entire fishing zone or a complete fishing year. Khan *et al.* (2003) concluded that on the basis of best available scientific information, the biomass estimates of demersal fish resources is 500 000 metric tons with possible MSY of 300 000 metric tons. They also emphasise

that annual production is reaching at their maximum and marginal potential is available for further exploitation of these resources.

In the absence of fisheries research vessel, fisheries statistics are being collected regularly at the main fish landing places. However, the continuous monitoring of this programme requires additional manpower, electronic facilities for processing of data, suitable statistical methodology and financial support for timely dissemination/publication of the data to the concerned authorities/agencies.

Abildgaard and Khan (1986) provides information about maximum sustainable yield available beyond 35 nautical miles, which is 16 000 metric tons and exploitable for six vessels of 300-350 GRT.

The number of overfished, depleted, and fully utilized stocks

Shrimps have an almost unlimited market in foreign countries. Shrimp stocks in Pakistan tend to have the maximum fishing pressure resulting in overexploitation as pointed out by Zupanovic, 1971; Appleyard *et al.*, 1981; van Zalinge *et al.*, 1986, 1987. A majority of the trawlers in Pakistan go mainly for shrimp fishing. They have recommended that shrimp resources would severely be damaged if the number of shrimp trawlers is not reduced sufficiently, by 500 to 650.

According to the study carried out by Khan *et al.* (2003), it reveals that each species of tuna have different seasonal pattern. The peak period for skipjack tuna is from September to June; Frigate tuna April to May and from August to November; kawakawa from July to December; yellowfin from September to January; longtail tuna from August to November and billfishes from September to June. The catch per unit of effort (CPUE) is also decreasing which indicate that tuna resources in coastal waters are being overexploited.

Catch statistics of crabs have also shown signs of overexploitation as maximum landings were recorded during 1999; thereafter it was decreasing. This is due to over harvesting of mud crab (*Scylla serrata*).

Khan *et al.* (2003) has reported that conventional resources of demersal finfish are reaching at their maximum sustainable level whereas squids and cuttlefish stocks are under utilized.

Are fishery managers legally required to adopt measures to address overfishing and rebuild depleted stocks?

There is no juridical notion of overfishing in the national and provincial regulatory documents, which provide the legal background for the governmental organizations managing fisheries. However, in the Fishing Rules amended by the fisheries authorities, ban on catching of particular species until the stock will be rebuilt, is imposed. Replenishment is traditionally targeted at carp species and penaeid shrimps.

What management tools are used?

The common management measures include prohibition of fishing using destructive or harmful fishing gears, regulation on net mesh-size limit, closed season, closed area. Pressure in managing fisheries has increased in recent years and weakness in law enforcement is one of the constraints in the country. There is no regulation on limitation of the number of fishing boats in small-scale fishery sector as access to fisheries resources is free in Pakistan.

Most of management tools are based on the provisions of the Fishing Rules. For most of demersal fish stocks these mechanisms include mesh size restriction and the restriction of gear. Furthermore in lobster fishery, catching of berried female and under sized lobster should be released back to the sea.

The industrial fishing are allowed only for those enterprises, which have a special permission issued by a registration authority (MFD). In this way limited entry will be used.

In shrimp fishery, close season during breeding season for shrimp catching is being adopted, it is also recommended that shrimp trawling in nursery area (creeks) should be prohibited.

Capacity management only targets industrial fishing. Licences are issued on the basis of vessels GRT. This measure is aimed at allocation zones for different sized vessel in EEZ. It is also recommended that fleet size of the shrimp trawler should be reduced to sustainable level.

No special management plans have been developed for particular fisheries and generally this targeted approach remains poorly understood within the agencies responsible for the assessment, management and enforcement.

Prohibited gears

Absolutely prohibited gears are dynamite fishing, using of poison and drugs for fishing and also all new methods of fishing not approved by the fisheries authorities. Other prohibited gears and methods are specified for particular species/stocks and areas. For example, bottom trawl and Katra nets are prohibited for catching shrimp in whole Baluchistan coastal area, whereas, in Sindh province coastal area Bhulo (stack-bagnet), Katra (modified of purse-seine) are prohibited.

Changes of management tools over the past ten years

The main objective of fisheries management is to obtain a maximum sustainable yield (MSY) or better yet maximum economic yield (MEY). The following methods are usually required to reduce the amount of fishing in overfished stocks (Gulland, 1971). These are: i) Closed seasons, ii) Closed areas; iii) Limit on the size or conditions of the fish that can be landed, iv) Restriction on gear (to control its selectivity and to affect its fishing power), v) Catch quotas (a single overall quota and allocated quotas, e.g. to vessels, to factories etc.), vi) Control on the amount of fishing (limitation on the number of vessels and limitation on the amount of fishing by each vessel).

The current Fishing Rules were introduced in 1990. They were based on the earlier version of the rules and retain most of the tools developed in the 1975-80s. The essential novelty is the introduction of the obligatory reporting of the position and catch data to the licensing authority and mandatory installation of the technical devices required for the satellite based monitoring of the industrial fishing vessel's position. The present system of fishery monitoring is enforcing since 2001. It implies daily reporting and transmitting the vessels position data to the enforcement agency headquarter (MSA). The resulting database is intended for fishery management and enforcement.

Has the introduction of management measures adopted in the past ten years improved the status of the fisheries/stocks?

In the past, fisheries management has resulted in several successes, in particular the recovery of lobster fishery. Similarly, a positive effect of the management (close season during breeding period) brought up the improvement of the shrimp stocks. In the last decade there is little indication that the status of particular fisheries/stocks has been improved as a result of the introduction of specific management measures. One of the reasons for this is the overcapacity of the fishing fleet, particularly for shrimp fishing, resulting high pressure of fishing which undermine management efforts.

What are the principal impediments to more effective management?

The fishery management system in Pakistan is non-integrative. The basic problem is the lack of effective cooperation between research, management, enforcement bodies and the stakeholders. There are departmental barriers to the effective information exchange between these groups of organizations. These institutions also have inadequate capacity building and financial resources for effective management studies.

Furthermore, the information on the status of stocks, fisheries and catch statistics is scarcely published and is hardly available for the experts outside the fisheries institutions, to the general public and the non-governmental organizations. The limitation of the information exchange complicates public control of the fishery management and development. To improve the feedback between the management authorities, fishing dependent communities and the general public much more information must be publicly available. This particularly refers to the information on the subsistence and the recreational fishery, their social role and environmental impacts.

In an effort to strengthen fisheries management, FAO has promoted the concept of developing management plans. Case studies were undertaken in Indonesia, Malaysia and Thailand. These management plans facilitate the forum for discussion among stakeholders. Through this forum, issues in the area of management, such as information on fish stocks, state of fishing and formulation of management measures, who will be responsible for what and how the overall process of managing the fisheries evolved are discussed extensively among stakeholders. Realizing the importance of fisheries management plan, some countries have gone further to the step with legal commitment, namely by incorporating provisions on management plan in the fishery legislation.

Pakistan also needs to develop fisheries management plan because it facilitates a good forum where fishery managers and stakeholders address together various issues in the management of the concerned fisheries. Through the development process of management plan, one would be able to see the kind of information (including statistics and stock assessment), required for management, management measures formulated and options of management measures offered, as cooperative effort to enhance sustainable fisheries.

COSTS AND REVENUE OF FISHERIES MANAGEMENT

The current budget for the fishery management consists of the costs of the functioning of fisheries institutions, the cost of enforcement at sea conducted by MSA, and the cost functioning of the relevant services of the Ministry of Food, Agriculture and Livestock involved in the process of fisheries management.

In order to combat IUU fishing, MSA is undertaking surveillance of EEZ and this surveillance is costing about Rs. 25 000 per hour by aircraft, Rs. 4 000 per hour by Corvette and Rs.2 500 per hour for Fast Petrol Boat (FPB).

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Pakistan has ratified UNCLOS and also adheres to the guidelines and Code of Conduct for Responsible Fisheries as laid down by the FAO of the United Nations. In order to protect the illegal, unregulated and unreported fishing by industrial fishing vessel adequate provision has been made to prevent infringement of the unlicensed vessels in the fisheries zones of the country. For the implementation of these regulations a full-fledged organization, Maritime Security Agency (MSA), under the Ministry of Defence has been established to ensure that no infringement is made in EEZ of the country. To implement the United Nations Convention on the Law of the Sea and Management of straddling fish stocks, Pakistan is willing to make an agreement for conservation and management programme of these fish stocks because of migratory behaviour, between the regional countries such as Yemen, Oman, Iran, Pakistan, India and the Maldives. This is necessary because management measures taken by one nation can seriously jeopardize exploitation activities of the other nations. The signing and ratification of UNCLOS had a considerable impact on the fishery management and development of bilateral cooperation.

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBs)

Pakistan is a member of Indian Ocean Tuna Commission (IOTC), Asia Pacific International Commission (APIC), International Oceanography Commission (IOC) and actively participating and cooperating in the activities of these RFBs.

Recently, a two days workshop on Fisheries Management Issues in SAARC Countries for Sustainable Development in the New Millennium was held from 25th March to 26th March at Sheraton Hotel, Karachi, Pakistan. The workshop was organized by Marine Fisheries Department, Ministry of Food, Agriculture and Livestock, Government of Pakistan in financial collaboration SAARC-Japan fund. The objective of the workshop was to address the important issues which have direct bearing on the development of fisheries and aquaculture in SAARC countries; various management measures have been taken by these nations, however, efficiency of some of these measures are still questionable. Closed seasons, bag limit, closed area, mesh size regulation and gear restriction etc are the major management tools in these countries, however, there is a need to learn from experience of fisheries management practices within SAARC countries, so as to adopt a rational management strategy for the development of fisheries for meeting the growing needs in the new millennium and devise proper management strategies for development of fisheries and aquaculture so as to cope with increasing fish demand in these countries and also to fulfill the obligations as to comply the International and Regional Fisheries Agreements.

SUMMARY AND CONCLUSIONS

Pakistan has special Federal and Provincial laws which regulate fisheries. At federal level, Exclusive Fishery Zone Act and the Territorial waters and Maritime Zone Act provide the bases for the management strategy at national and provincial levels. Reported catch of marine capture fisheries (1997-2002) ranged from 0.382 to 0.474 million tonnes. There is a decreasing trend in the production after 1999. Shrimp fishery is the backbone of the fish industry as it contributes 90 percent of total earning from coastal fisheries. Industrial fishing by foreign flag deep sea fishing vessel also has substantial contribution in development of fisheries. Fisheries management in EEZ is carried out through licensing, indicating exploitable stocks/species, designating environmentally friendly fishing gear and methods and by enforcing restrictions with regards to closed season, closed areas etc. Fisheries management, enforcement and research institutions have inadequate capacity building and financial resources.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries in Pakistan

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	100	Nil	100	unchanged
Regional	50	Nil	100	increasing
Local				

Summary information for three largest fisheries in Pakistan (by volume) (2002)

Category of Fishery	Fishery	Volume m. tons	Value mil USD ¹	% of Total Volume Caught ²	% of Total Value Caught ²	Covered by a Management Plan?	# of Participants ³	# of Vessels ³
Industrial	1. Shrimp	22 377	104 996	36.3	77.2	No	28 380	2 580
	2. Tuna	34 917	27 090	56.7	19.9	No	37 250	1 862
	3. Demersal	4 270	3 843	6.9	2.2	No	140	14 vessels
Artisanal	1. Demersal gillnet	270 893	323 939	76.3	97.8	No	62 105	10 147
	2. Small pelagic	84 294	7 266	23.7	2.2	No	n.a.	n.a.
Recreational	1. Billfish/tuna	30	41 379	23	30	No	100	20
	2. Sport fishing (pelagic)	50	51 724	38	38	No	300	50
	3. Hand-line fishing (bottom fishing)	50	43 103	38	32	No	500	100

1. Value in 2002 U.S. Dollars.

2. % values are based on totals for each category of fishery.

3. Number of participants and fishing vessels in category of artisanal fishery is of combined fishery.

n.a. = not available.

Use of Fishery Management Tools within the three largest fisheries in Pakistan

Category Of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-Based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1. Shrimp	Yes	Yes	Yes	No	Yes	No	No	No	No
	2. Tuna	No	No	No	No	Yes	No	No	No	No
	3. Demersal	Yes	No	Yes	No	Yes	No	Yes	Yes	No
Artisanal	1. Demersal gillnet	Yes	No	Yes	No	Yes	No	No	No	No
	2. Small pelagic	Yes	No	No	No	Yes	No	No	No	No
Recreational	1. Billfish/tuna	Yes	No	No	No	No	No	No	No	No
	2. Sport fishing (pelagic)	Yes	No	No	No	No	No	No	No	No
	3. Hand-line fishing (bottom fishing)	Yes	No	No	No	No	No	No	No	No

Costs and Funding Sources of Fisheries Management within the three largest fisheries in Pakistan

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1. Shrimp	Yes	Yes	No	No	No	No
	2. Tuna	Yes	Yes	No	No	No	No
	3. Demersal	Yes	Yes	Yes	No	No	No
Artisanal	1. Demersal gillnet	Yes	No	No	No	No	No
	2. Small pelagic	Yes	No	No	No	No	No
Recreational	1. Billfish/tuna	No	No	n.a.	n.a.	n.a.	n.a.
	2. Sport fishing (pelagic)	No	No	n.a.	n.a.	n.a.	n.a.
	3. Hand-line fishing (bottom fishing)	No	No	n.a.	n.a.	n.a.	n.a.

n.a. = not available.

Compliance and Enforcement within the three largest fisheries in Pakistan

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1. Shrimp	No	No	No	No	No	No
	2. Tuna	No	No	No	No	No	No
	3. Demersal	Yes	Yes	Yes	Yes	Yes	Arial
Artisanal	1. Demersal gillnet	No	No	No	No	No	No
	2. Small pelagic	No	No	No	No	No	No
Recreational	1. Billfish/tuna	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	2. Sport fishing (pelagic)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	3. Hand-line fishing (bottom fishing)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

n.a. = not available.

Capacity Management within the three largest fisheries in Pakistan

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1. Shrimp	Yes	Yes	Decreasing	No	
	2. Tuna	Yes	Yes	Decreasing	No	
	3. Demersal	Yes	Yes	Decreasing	No	
Artisanal	1. Demersal gillnet	No	No	Fluctuating	No	
	2. Small pelagic	No	No	Fluctuating	No	
Recreational	1. Billfish/tuna	n.a.	n.a.	n.a.	n.a.	
	2. Sport fishing (pelagic)	n.a.	n.a.	n.a.	n.a.	
	3. Hand-line fishing (bottom fishing)	n.a.	n.a.	n.a.	n.a.	

n.a. = not available.

Proposed Enhance Penalties to be Provided in Exclusive Fishery Zone (regulation of Fishing) Rules, 1990

S.No.	Violation of Fishing Rules	Existing Amount of Penalty/ Compensation	Proposed penalties
1	Fishing beyond the period of the validity of the license (i.e. violation of Rule 6)	Rs.200 000/vessel	Rs.1 000 000/vessel
2	Fishing in violation of Rule 17 (i.e. Fishing beyond the Specified Zone/Area)	Rs.200 000/vessel	Rs.1 000 000/vessel
3	Fishing craft not licensed (i.e. violation of Rule 3(2))	Rs.500 000/vessel	Rs.2 000 000/vessel+ confiscation of vessel and fish catch/vessel
4	Non-supply of report/information about fish catch i.e. violation of Rule 18)	Rs.10 000/cruise	Rs.25 000/cruise
5	Catching of shrimps, lobsters loaded with egg (berried lobsters) and lobster of 15 cm – (i.e. violation of Rule 15 and 16)	Rs.50 000/ or confiscation of fish or both	Rs.300 000/cruise + confiscation of shrimp and lobster catch
6	Landing at ports not having customs/check post, (i.e. violation of Rule 20)	Rs.50 000/ or confiscation of fish or both	Rs.1 000 000 per carrier vessel
7	Operation/employment of any other ship or carrier vessels or any other vessel not approved, (i.e. violation of Rule 28(2))	Rs.50 000/vessel	Rs.500 000 per carrier/vessel
8	Export of fish not through proper channel, (i.e. violation of Rule 29)	Rs.600 000 + cost of fish as determined by the licensing authority	Rs.1 500 000 + cost of fish as determined by the licensing authority
9	Change in crew, officers, equipment, gears, wireless etc. without prior permission, (i.e.violation of Rule 32)	Rs.50 000/cruise	Rs.200 000/cruise
10	Failure to furnish information about fishing and other cruise details etc. (i.e. violation of Rule 23)	Rs.50 000/cruise	Rs.400 000/cruise
11	Failure to have onboard the departmental representative as required under Rule 12	Rs.25 000/cruise	Rs.100 000/cruise
12	Non-appointment of the prescribed local crew and their training as required under Rule 30	Rs.1 000/crew member/cruise	Rs.50 000/crew member/cruise

Country review: Qatar

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September 2004

INTRODUCTION

Qatar is situated on a peninsula on the western side of the Gulf that separates Iran from the Arabian Peninsula and has a small coastline to that Gulf. The country shares resources with its close neighbors of Saudi Arabia, Bahrain and the United Arab Emirates, with the definition of its sea boundaries with Bahrain having only recently been settled. Because of its location and the regional distribution of many of the key species taken by the commercial fishery in Qatar, independent management of the stocks of fish in Qatari waters is difficult and regional co-operation is necessary for effective management of many species.

Like other countries in the region, the sea area and coastline of Qatar is characterized by extreme meteorological and hydrological conditions with water temperatures reaching over 33° C during summer months (air temperatures of over 50° C), very high evaporation rates and high salinities. Seasonal variation in hydrological parameters is also high with water temperatures varying from around 19° C in winter to 32° C in summer.

The fisheries of Qatar are all artisanal in nature, after the closure of the semi-industrial shrimp fishery in 1993. Periodic assessment of the shrimp stocks of Qatar's waters are undertaken but, to date, these assessments have not indicated sufficient resources to justify the re-opening of this resource to commercial exploitation.

The fishing industry in Qatar currently consists of 515 licensed, small vessels¹ that utilize a variety of gear to take a range of demersal and pelagic species. Fish trapping is the most common fishing method and targets groupers and emperors in addition to other minor demersal species. These two species groups account for around 42 percent of total fish production in Qatar of approximately 8 600 tonnes (in 2001). Seasonal trolling and handlining for Spanish mackerel (*Scombermorus* spp.) is also a significant activity of the fleet and, in 2001, accounted for around approximately 1 019 tonnes (12 percent) of total fish production.

Fisheries management in Qatar is rudimentary although vessels and fishermen are licensed. A major advancement in bringing fishing capacity under control was the cessation of issuing new fishing licenses in 1998. This resulted in a fleet that was fixed at 515 vessels. However, no gear restrictions were introduced and no restrictions were placed on vessel size and, as a result, new and larger replacement vessels have been introduced into the fleet. These larger vessels carry and operate larger numbers of fish traps² in particular and employ a greater number of crew and hence fishing effort has increased in recent years.

¹ Although ownership of vessels is restricted to Qatari nationals, the industry depends heavily on expatriate labor, mainly from India, Bangladesh and Iran, to actually undertake fishing operations. This dependence is a cause for some concern because of its impact on local manpower development. However, as Qatar standards of living have accelerated as a result of the oil and gas industry, fewer Qataris are drawn to the traditional pursuits of fishing. This is an issue that is also faced by other rapidly developing nations in the region.

² Like other countries in the region, there is general concern about the impact of lost fish traps, which probably continuing fishing and contribute to fish mortality. However, no data are available from Qatar about the extent of the losses or the impact that these lost traps have on demersal fish stocks.

Unlike neighboring countries, imports of fisheries products to Qatar have only risen slowly from 1 227 tonnes in 1995 to 1 679 tonnes in 2001. This is primarily a result of local increasing demand being met by increasing local production. However, this increased local production (particularly of species taken by fish traps) appears to be a result of increasing fishing effort. The challenge for Qatar may be to bring that fishing effort under control before it results in over-exploitation of its key commercial species.

POLICY FRAMEWORK

The national, or federal, authority with responsibility for fisheries management is the Ministry of Municipal Affairs and Agriculture. The structure of the Ministry is such that the Fisheries Department of the Ministry is responsible for fisheries affairs, including policy, licensing and collation and collection of statistics. The Fisheries Department does not undertake any fisheries research although specific studies have been commissioned in the past.

The subsidization of local fisheries remains an important part of Government management policy and measures and is included as a specific objective of fisheries management policy. Only Qatari nationals who are vessel owners benefit from these subsidies since foreign workers on the vessels are engaged on a contract basis.

The requirement to develop fisheries management plans is not contained in any legislation and no fisheries management plans currently exist for any fishery. As a result, policy directions for management of individual fisheries are not explicit and are often subject to change through political or administrative influences.

The Ministry of Municipal Affairs and Agriculture is also the agency with responsibility for international fisheries issues. However, regional co-operation is weak although informal discussions on fisheries management issues with the neighboring countries of Saudi Arabia and Bahrain have taken place. Qatar ratified the UN Convention on the Law of the Sea (UNCLOS) in 2002 but has not yet ratified the UN Fish Stock Agreement or the FAO Compliance Agreement.

LEGAL FRAMEWORK

Responsibility for fisheries management in Qatar lies with the Fisheries Department of the Ministry of Municipal Affairs and Agriculture although national and regional environmental authorities (particularly the Qatar Supreme Council for the Environment and Natural Reserves and the Regional Organization for the Protection of the Marine Environment, ROPME) have influence in management of marine areas³.

Qatar has well-developed environmental protection legislation and this often has significant influence in fisheries and marine management issues, including issues related to marine reserves, administration of port areas, and coastal development. The coastal development legislation and processes is particularly important in impacting on fisheries resources and their management, given the extensive coastal development and urbanization that is occurring in Qatar.

The Fisheries Department of the Ministry of Municipal Affairs and Agriculture administers the basic national fisheries legislation in Qatar, which is contained in Law No.4 of 1983 for the use and conservation of marine resources. Emiri Decree No. 17 of 1993 subsequently amended this basic fisheries Law. Various Ministerial Decisions and directives implement specific actions under the basic law, including the Ministerial decision of 1993 to ban shrimp fishing in Qatari waters.

³ Although the Gulf Co-operation Council considers fisheries issues, it does not involve itself with regional fisheries initiatives.

STATUS OF THE FISHERIES

The fisheries of Qatar are all artisanal in nature and utilize traditional dhows and small outboard-powered fiberglass vessels to take both pelagic and demersal fish species. The fishery is a multi-species, multi-gear fishery with vessels using fish traps (locally known as 'gargoor'), gillnets, handlines and troll lines to take a variety of fish, often on a seasonal basis. Fish traps are the most common fishing gear and account for the majority of the fish catch. Groupers, emperors and jacks are the most common component of the fish trap catch, with groupers (*Epinephelus* spp.) and emperors comprising around 42 percent of total Qatar fish production in 2001.

Total landings and the number of fishermen have increased steadily over the last 20 years, with landings doubling since 1995 from 4 271 t to 8 863 t in 2001. The increase in landings has generally been for all species, and most likely reflects an increase in fishing effort for most fisheries sectors.

Qatar introduced a freeze on the issuing of new fishing licenses in 1998 and this has assisted in controlling fishing capacity. However, there were no restrictions introduced on fishing gear limitation or the size of vessels. As a result, replacement vessels of a larger size and carrying more fishing gear (particularly fish traps) and crew have entered the fishery in recent years. This has resulted in significant, but unmeasured, increases in fishing effort despite the restrictions on the issuing of new licenses. Such effort increases have resulted in increased landings (particularly for species such as grouper that are taken by fish traps) and have enabled Qatar to meet increased domestic demand from local production. However, with no robust stock assessment having been undertaken for any of the major commercial species, it is uncertain to what extent these fishing effort increases can be sustained before landings of major species decline. Certainly, catch rates are declining as fishing effort is increasing, particularly in the fish trap fishery.

Illegal fishing is, like other countries in the region, a major problem for management authorities. Driftnets are banned, but continue to be used routinely by fishermen. A Fisheries Enforcement Committee was established in 1997 to address the issue of illegal fishing, but this still remains a significant problem.

The characteristics of Qatar's fisheries are shown in Table 1.

TABLE 1
Characteristics of the largest fishery (by volume) of Qatar

Category of Fishery	Fishery	Volume tonnes	Value* US\$ million	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan?	# of Participants	# of Vessels
Artisanal	Coastal Artisanal	8 684	26.4	98	98.6	No	4 721	515

*Value in 2002 U.S. Dollars.

Note: Qatar has no industrial fisheries and hence the multi-species, multi-gear coastal artisanal fishery represents over 98 percent of total fisheries production in Qatar. There is currently no data on the developing recreational fisheries sector.

In summary, increasing, but unmeasured, fishing effort as well as environmental issues such as land reclamation and dredging are emerging as significant issues in Qatar's fisheries. However, the lack of a detailed time series of data on landings, size composition and fishing effort, together with the shared nature of the stocks and the lack of comprehensive and regular assessments of the status of the major fish stocks, makes precise assessment and definition of required remedial action difficult.

MANAGEMENT ACTIVITY

Qatar was one of the first countries in the region to introduce management measures for its fisheries, particularly the once-important shrimp fishery. These management measures included closed areas, minimum mesh sizes and fishing capacity limitation through limited entry. However, declining catches and catch rates in the 1980s resulted

in the closure of the fishery in 1993 and, to date, stocks have not recovered significantly enough for the Government to contemplate a re-opening of the fishery.

However, limited resources within the management authority have stifled research, policy development and enforcement for other fisheries that are of current importance and no formal management plans exist for any fishery. Input controls are used exclusively in Qatar's fisheries and no fishery is managed by output controls. Gear restrictions such as minimum mesh sizes for gillnets, a ban on driftnets and size limits for major fish species are in place. Closed seasons and closed areas (a result of marine protected areas) are in place for a number of species, most notably a defined season for gillnetting of Spanish mackerel (*Scomberomorus* spp). However, in all cases, compliance is limited.

Stakeholder participation in the development of fisheries policy and management measures is through traditional discussions, often directly with senior Government officials. In general, these discussions are often concerned with subsidies and any other management issue discussed often results in compromise solutions. Such stakeholder participation is limited to nationals only, who are the vessel owners and may or may not be actively engaged in fishing. The expatriate workers on the vessels are not involved in such dialogue on management measures.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No separate data is maintained by the Fisheries Department of the Ministry of Municipal Affairs and Agriculture on the costs that are directly attributable to fisheries management issues. However, over the past ten years, budgets for fisheries management has certainly stagnated as management activities decline.

A significant part of the fisheries budget within the Fisheries Department is utilized for the payment of subsidies to vessel owners. These subsidies are often at the discretion of the Minister and are often *ad hoc* in response to specific representations from fishers.

No separate budget is maintained for research services, which are mainly contracted by the Department of Fisheries on an 'as needed' basis.

Compliance is undertaken by the Coast Guard and by the Qatar Police, both of whom have the capacity to undertake at-sea inspections. Again, no separate accounting of compliance and enforcement costs is maintained within the Department of Fisheries. At-sea enforcement by the Coast Guard is also not accounted separately since fisheries-related issues are generally attended to during regular sea patrols for other purposes.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Qatar ratified the UN Convention on the Law of the Sea (UNCLOS) in 2002, at the same time as ratification of Part XI of the Convention related to deep seabed mining. Qatar has not ratified the UN Fish Stocks Agreement or the UN Compliance Agreement.

Although the Fisheries Department is aware of the content of initiatives such as the Code of Conduct for Responsible Fisheries, the provisions of this, or other initiatives, have not been incorporated into national legislation.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Qatar is an active member of the Regional Commission on Fisheries (RECOFI) and participates in most of the meetings and working groups of the Commission. However, RECOFI has not pursued any regional management initiatives to date. As a result,

Qatar, therefore, has not been required to incorporate regional fisheries management issues into its national legislation.

There is, however, no legal requirement within the Qatari fisheries legislation for fisheries management issues that may be adopted by RECOFI (or other regional body) to be incorporated into national legislation.

SUMMARY AND CONCLUSIONS

Qatar's fisheries remain small, both in terms of overall landings and as a contribution to national GDP. However, despite this, Qatar has, in contrast to other countries in the region, succeeded in limiting imports of fish and fish products to meet increasing domestic demand and has, instead, been able to increase national production to meet this demand. This increased domestic production, however, seems to have occurred as a result of an increase in fishing effort (particularly in the fish trap fishery), despite Qatar's efforts at limiting fishing capacity by imposing a freeze on the issue of new fishing licenses.

The absence of data on fishing capacity, stock assessments of the major commercial species and an understanding of the extent to which stocks are shared with other countries of the region make this increase in fishing effort particularly worrying since its impacts on the sustainability of Qatar's fish stocks are uncertain.

Illegal fishing also poses a major and unique challenge to Qatar, given the small size and importance of its fishing industry. At the present time, illegal fishing is common because of the inability of the enforcement agency to adequately ensure full compliance with fisheries regulations. The small-scale and value of Qatar's fisheries adds to this problem because it is simply not economical to expend significant money and resources on enforcement activities for such fisheries. In addition, the developing recreational fishing sector (currently estimated in excess of 1 000 vessels, most of which undertake some part-time fishing activity) is currently not monitored or controlled. Given current trends, it is conceivable that this recreational fishing sector may become more important than the commercial fishery within a short time and therefore management issues for this fishery need to be addressed as soon as possible.

REFERENCES

Anon. 2003. Qatar Country report to second RECOFI meeting, Muscat, May 2003.

APPENDIX TABLES

Current management of marine capture fisheries in Qatar

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	< 33	< 33	< 33	Unchanged
Regional	n.a.	n.a.	n.a.	n.a.
Local	n.a.	n.a.	n.a.	n.a.

Use of fishery management tools within the three largest fisheries in Qatar

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Finfish	Yes	No	Yes	No	Yes	No	No	No	No
Recreational	Boat-based	Yes	No	No	No	No	No	No	No	n.a.

n.a.: not applicable

Costs and funding sources of fisheries management within the three largest fisheries in Qatar

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Finfish	Yes	Yes	Yes	No	No	No
Recreational	Boat-based	No	No	No	No	No	No

n.a.: not applicable

Compliance and enforcement within the three largest fisheries in Qatar

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Finfish	No	No	No	No	Yes	n.a.
Recreational	Boat-based	No	No	No	No	No	n.a.

n.a.: not applicable

Capacity management within the three largest fisheries in Qatar

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	No industrial fisheries	n.a.	n.a.	n.a.	n.a.	n.a.
Artisanal	Finfish	Yes	No	Constant or decreasing	No	n.a.
Recreational	Boat-based	No data but probably yes	No	No data	No	n.a.

n.a.: not applicable

Country review: Saudi Arabia

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August 2004

INTRODUCTION

Saudi Arabia occupies 80 percent of the area of the Arabian Peninsula and is bordered on the west by the Red Sea and on the east by the Gulf that lies between Iran and the Arabian Peninsula. Although the length of coastline bordering the Red Sea represents about 79 percent of the total Saudi coast, production from the Red Sea area in 2001 was 20 734 tonnes, or slightly less than 50 percent of total production. The remainder was taken from the Arabian Gulf coast. Production in the Red Sea is dominated by groupers (2 594 tonnes in 2000), emperors (2 791 tonnes) and scads and jacks (2 827 tonnes). While these species are also important in the Arabian Gulf, production of shrimp (4 760 tonnes in 2000) and kingfish (2 250 tonnes) also constitute important components of the catch.

The traditional or artisanal fishery as well as industrial fisheries operates in both the Red Sea and the Arabian Gulf areas. In the Arabian Gulf, the industrial sector is solely concerned with shrimp production while the artisanal sector uses fish traps (locally known as 'gargoor'), gillnets, handlines, trolling and small shrimp trawl nets. In addition, a small number (five in 2001) of traditional stake nets (hadrah) are still utilized in the area. The industrial fleet of the Arabian Gulf coast, which is based in Dammam, exclusively targets shrimp although fish by-catch from these bottom trawling operations is an important component of the catch and is also landed and marketed. Fish trap fisheries dominate artisanal production in the Arabian Gulf with 44 percent of production coming from this method in 2001.

In the Red Sea, artisanal fisheries production is almost entirely from handline and gillnets, while the industrial fleet utilizes fish and shrimp trawl nets and purse seine nets. The industrial vessels operating in the Red Sea utilize trawl nets to target both demersal fish stocks and shrimp, with the majority of these vessels belonging to Saudi Fisheries Company and operating out of Jizan on the southern Red Sea coast.

In 2001, 5 892 tonnes of the total Red Sea production of 20 734 tonnes came from the industrial fish trawlers with the remainder from the artisanal sector. This can be compared with the Arabian Gulf coast where, in 2001, 98.3 percent of the total production of 24 605 tonnes came from the artisanal sector.

Catch rates are generally higher in the Arabian Gulf for most fishing methods with catches/day ranging from 132 kg/day for trap fishing boats in the Arabian Gulf (compared with 23 kg/day for trap fishing boats in the Red Sea) to 15 kg/day for handline vessels in the Red Sea.

The artisanal fishing fleet of the Kingdom includes 9 436 boats of which 7 611 operate in the Red Sea and 1 825 in Arabian Gulf waters. The industrial fleet consists of 149 boats in the Red Sea (primarily operating out of Jizan on the southern Red Sea coast) and 34 boats on the Arabian Gulf. 4 172 professional fishermen and 8 186 employees in the secondary fisheries sectors operate in the Red Sea area; while 1 715 professional fishermen and 6 939 secondary sector employees operate in the Arabian Gulf areas. The majority of fishermen are Saudi nationals while expatriate workers (predominately from India, Egypt and Bangladesh) dominate the secondary production sector as well as being employed as crew on fishing vessels.

Although the artisanal fisheries are the largest by volume in the country, the industrial shrimp fishery of the Arabian Gulf and, to a lesser extent, the southern Red Sea remains the most valuable, as it has been for many years. The wholesale value of the industrial shrimp catch in 2002 was US\$ 45.2 million (Table 2) although, because of declining landings, this is less than the value of US\$ 66.0 million five years ago. Estimates of the wholesale value of the artisanal fishery in 2001 are approximately US\$ 38.8 million for the Arabian Gulf and US\$ 23.7 million for the Red Sea with the value of the Red Sea artisanal catches having increased slightly from US\$ 21.1 million during the past five years despite landings having declined. This is a result in the increase in the wholesale price of most fish species.

The largest operator in the industrial sector is Saudi Fisheries Company, which was established in 1980 (1401H) as a joint stock company, according to Royal Decree No. M/7 of 1979. The Company was established with a fully paid capital of SR 100 000 000 with 40 percent contributed by the Government and the remaining 60 percent raised from the private sector.

The Company was established to develop investment opportunities in fishing and aquaculture production together with the production and sale of seafood both locally and in the International market.

The Company's Head-office and primary processing plants is located in Dammam and another plant based in Jizan on the southern Red Sea coast. SFC also operates processing and distribution depots in Riyadh and Jeddah. The Company also has cold stores at Dammam, Jizan, Jeddah and Riyadh having a total storage capacity of 4 000 tonnes.

The company operates a fleet of industrial vessels with on-board processing, fish and shrimp aquaculture farms, land-based processing plants, retail and wholesale shops throughout the Kingdom and is a major exporter of fresh and processed fish and fish products.

The primary fisheries management agency in the Kingdom is the Ministry of Agriculture and Water, which, in addition to fisheries, is responsible for agriculture, forestry and water resources in the Kingdom. Fisheries issues are addressed by the Fisheries Sector directorate within the Ministry, which is under the Chairmanship of the Deputy Minister for Fish Resources Affairs. The fisheries administration and management functions of the Ministry were established in 1988 through Royal Decree 7/505M dated 28/3/1406 (equivalent to 1988) which established the Ministry as being responsible for fisheries. Subsequent implementing regulations and administrative decisions from MAW regulate fisheries.

The Ministry has input controls in place for the industrial shrimp fishery where the number of vessels is limited, while mesh size regulations, size limits and closed areas and seasons are imposed on the artisanal sector. Various closed areas in both the Red Sea and the Arabian Gulf are also in place for shrimp and fish species. However, enforcement of these regulations is weak and illegal fishing is common. There are no controls on outputs and no fishery is managed under a quota or ITQ system. The Ministry also has an enforcement office to control and enforce the management measures although actual enforcement is performed by the Coast Guard and other marine agencies. The Ministry also collects landings statistics as well as collating import and export data and sociological data on fishermen.

Although total landings from Saudi Arabia have remained approximately constant since about 1985 at around 40 000 tonnes, these landings have been maintained by more than a doubling of the number of fishing vessels (mainly artisanal) and a quadrupling in the number of fishermen. The Ministry has been addressing this problem by imposing a temporary ban on the issue of new fishing licenses and by restricting ownership of artisanal vessels to one per fisherman. However, this has been largely ineffective because there were no additional restrictions on the size or capacity of replacement vessels and

therefore there have been significant increases in the size of vessels so that they can carry more fishing gear. These larger vessels require additional crew and hence the number of fishermen has increased at a greater rate than the number of fishing vessels.

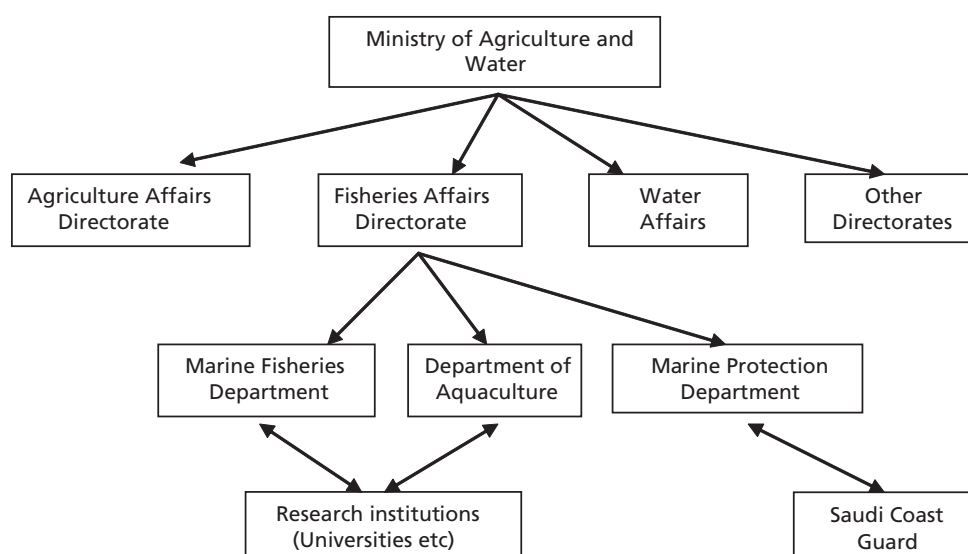
With the increase in fishing capacity, particularly in the artisanal fishery, some of the major stocks have shown recent signs of over-exploitation. Landings of grouper in the Arabian Gulf have declined in recent years, in common with other countries in the region and the important shrimp fishery in the Arabian Gulf has also shown recent signs of over-exploitation and the industrial fleet having been reduced to 34 vessels from the previous 45. However, as a result of pressure from artisanal fishermen, the length of the fishing season has been extended to compensate for lower catches and, since 2002, has opened on August 1 each year.

The increasing fishing capacity within the Saudi Arabian artisanal sector (which has occurred without parallel increases in catches from the sector) poses significant problems for the managing authority, particularly since subsidization of the sector and ensuring employment and investment opportunities for Saudi nationals remain pillars of the fisheries management approach. Recognizing these issues, the Ministry has attempted to deflect investment from capture fisheries into aquaculture and has set an ambitious production target of 50 000 tonnes per annum from this sector. However, unless fishing capacity in the Kingdom's marine artisanal sector can be effectively limited, the stocks of marine fish in both the Arabian Gulf and the Red Sea areas will come under increasing pressure in future years and may, despite increases in fishing capacity, finally result in a decline in total landings, something that has been avoided so far.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Saudi Arabia is the Ministry of Agriculture and Water, which was provided with the authority to administer and manage fisheries in 1988. It co-operates with other Ministries in achieving fisheries management outcomes, most commonly by the formation of temporary inter-Ministerial committees to address specific issues. The Fisheries Affairs Directorate within the Ministry is responsible not only for marine fisheries management but also for aquaculture and marine protection.

The structure of the Ministry of Agriculture and Water is as follows:



Management of fisheries resources in Saudi Arabia is very much development-orientated with the stated overall policy objectives being:

- To produce fresh fish for local markets as part of national food security policy.
- To develop sustainable and responsible fisheries management through stock conservation measures.
- To improve the economic performance of different fishery sectors through better utilization of the marine environment.
- To subsidize local fish production supplied from both capture fisheries and aquaculture.
- To encourage and increase fish supply from aquaculture in order to reduce fishing pressure on local stocks.

There are currently no management plans in place for any of Saudi Arabia's fisheries and, as a result, fisheries policy has tended to be ad hoc and the few management measures that have been introduced have usually been done so to address short-term, specific problems.

The industrial sector, which is dominated by the partly Government-owned Saudi Fishing Company has a broad mandate to manage its own affairs and essentially establishes fisheries management policy for its own activities to ensure both profitability and development opportunities. It also undertakes and commissions research to support these management activities. In cases where conflict between their activities and the activities of the artisanal sector have occurred (e.g. between inshore, artisanal shrimp vessels taking small shrimp in the Arabian Gulf and the company's industrial vessels taking shrimp further offshore), the company has tended to make recommendations directly to the Ministry as to steps to take to resolve the issue, although these recommendations are not always followed. There are no formal decision-making processes within the Ministry of Agriculture and Water for incorporating stakeholders' views and representations are generally made on an *ad hoc* basis. The Ministry does, however, become involved in setting fishing seasons and specifying mesh sizes in consultation with both the company and the artisanal fishermen.

Subsidization of artisanal fishing activities by the Government is an important part of fisheries management policy in Saudi Arabia. These subsidies take the form of both cash payments in compensation for lost catches or gear as well as subsidized services such as engine and net repair. While the industrial sector does not appear to receive direct subsidies, indirect subsidies are common, particularly in the development of their infrastructure of processing plants and wholesale and retail outlets.

International fisheries issues are also the responsibility of the Ministry of Agriculture and Water. Saudi Arabia participates in the activities of the Regional Fisheries Commission (RECOFI) although effective regional co-operation is weak or virtually non-existent, both on a bilateral basis and through RECOFI. Saudi Arabia ratified the UN Convention on the Law of the Sea (UNCLOS) in 1996 but has not ratified the UN Fish Stocks Agreement or the FAO Compliance Agreement.

LEGAL FRAMEWORK

Saudi Arabia's legal framework for fisheries, as with other sectors, begins with the Constitution, which, since Saudi Arabia is governed by Sharia Law, is the Holy Qu'ran. Legislation is established by resolution of the Council of Ministers but all legislation must be ratified by Royal Decree from the King and be compatible with the Constitution and Holy Qu'ran. Following a resolution from the Council of Ministers, Royal Decree 7/505M dated 28/3/1406 (equivalent to 1988) established the Fisheries Resources Sector as part of the Ministry of Agriculture and Water (MAW), under the Chairmanship of the Deputy Minister for Fish Resources Affairs. The Decree also allocated responsibility for all fisheries affairs (interpreted as management, development and protection of resources, fishermen's and fishing company's social and economic issues and marine area protection) to the Fisheries Resources Sector of MAW.

The same Decree (7/505M) also established the Meteorology and Environment Protection Administration which deals with marine protected areas.

The Implementing Regulations were published shortly after Decree 7/505M and is composed of ten sections and 125 articles. The various Sections of the Implementing Regulations consist of: definition and terms (sect. I); general provision (sect. II); use and exploitation of living aquatic resources (sect. III): fishing license (chap. 1); labor (chap. 2); artificial and traditional fishing means (chap. 3); conservation, transport, marketing and production of aquatic resources (chap. 4); manufacture and maintenance of fishing gear and means (chap. 5); agricultural bank and credits (chap. 6); living aquatic resources protection (sect. IV)]; forbidden and prohibited (sect. V): [fishing gear and means (chap. 1); zones and periods (chap. II)]; diving (sect. VI): [diving license (chap. 1); diving license of instructors and assistants (chap. 2); creation of a centre for diving training (chap. 3)]; aquaculture (sect. VII): [aquaculture license (chap. 1)]; cooperatives (sect. VIII); competence and suitability of the Ministry of Agriculture and Water (sect. IX); offenses and penalties (sect. X).

Additional regulations and administrative decisions of the Ministry of Agriculture and Water, which have been issued on an *ad hoc* basis, implement the details of fisheries management and administration.

The Saudi Fisheries Company, which is the dominant company in industrial fisheries (including catching, processing, exporting, wholesaling and retailing as well as aquaculture production), was also established by Royal Decree in 1980 (Royal decree No. M/7 of 1979) as a joint stock company. The company has responsibility for contributing to food security of the Kingdom for fish and fish products and has broad responsibility for managing its affairs and the resources it exploits to achieve this objective.

There are a number of Royal Decrees that address the limitations of the territorial sea of Saudi Arabia and the location of its boundaries with neighboring countries. These boundary issues essentially follow the requirements and guidelines of the UN Convention on the Law of the Sea.

STATUS OF THE FISHERIES

While Saudi Arabia collects and publishes comprehensive statistics on landings, employment, number of fishing vessels, number of fishing trips by type of gear used and trade in fish and fisheries products, there is little information available on fishing capacity or the location from which catches are taken. Like other countries of the region, Saudi artisanal fishermen often fish outside of their territorial waters, with such catches being included in Saudi landings, if they are landed in Saudi Arabia. Likewise, if catches taken from Saudi Arabian waters are landed in neighboring countries, then these catches are not included in Saudi Arabian statistics. These two issues of the relationship between catch and landings and the lack of detailed fishing capacity data (together with the regional distribution of many exploited fish species) makes assessment of the status of most stocks in Saudi waters difficult.

Stock assessment research has not been a priority in Saudi Arabia, although Saudi Fisheries Company has undertaken such research, particularly to determine sustainable levels of exploitation of the shrimp resources of the Arabian Gulf area. Unfortunately, the results of this research are not readily available. Kedidi (1988) and Sakurai (1998) have commented on various indicators of exploitation for major exploited species but have not undertaken formal assessments of the major stocks.

Recent declines in landings of some major species, such as Spanish mackerel (*Scomberomorus comers*) and grouper (*Epinephelus* spp) in the Arabian Gulf appear to mirror similar declines in abundance in neighboring countries. As a result, there is a regional concern for the status of these species. Likewise, the important shrimp resources of the Arabian Gulf have declined in recent years, despite a reduction in

TABLE 1
Characteristics of the largest fisheries (by volume) of Saudi Arabia

Category of Fishery	Fishery	Volume (Est. in tonnes)	Value* US\$ million	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan?	# of Participants (Est.)	# of Vessels (Est.)
Industrial	Industrial shrimp	4 760	45.2	45.1	75.5	No	290	34
	Industrial trawl	5 892	14.7	54.9	26.5	No	1 200	149
Artisanal	Arabian Gulf artisanal	24 236	38.8	62.0	62.1	No	8 654	1 825
	Red Sea artisanal	14 842	23.7	38.0	37.9	No	12 358	7 611

* Estimated Value in 2002 U.S. Dollars.

TABLE 2
Changes in Saudi Arabian fisheries (1989-2001)

Year	Red Sea Area			Arabian Gulf Area		
	Landings (tonnes)	# of artisanal vessels	# of Industrial vessels	Landings (tonnes)	# of artisanal vessels	# of Industrial vessels
1989	32 648	3 491	60	14 502	1 396	20
1995	22 889	5 258	116	19 580	1 908	45
2001	20 734	7 611	149	24 605	1 826	34
% change, 1989-2001	-36.5%	118.0%	148.3%	69.7%	30.8%	70.0%

industrial fishing capacity. However, artisanal fishing effort (fishing on small shrimp in inshore waters) has increased and may be a significant contributing factor to the decline in shrimp landings. Moreover, under pressure from the artisanal fishery because of declining catches, the Ministry has allowed an earlier opening of the shrimp season in recent years, resulting not only in increased fishing effort (at a time when fishing effort should probably be curtailed) but also in shrimp being captured at very small sizes in or near inshore nursery areas.

Likewise, landings of grouper, snapper and jacks in some areas of the Red Sea have either declined or remained steady as (mainly) artisanal fishing effort has increased. Total fish landings from the Red Sea have declined by around 36 percent over the period 1989-2001, despite a more than doubling of the artisanal and industrial fishing fleet.

Despite the lack of comprehensive stock assessments of the major species, the generally accepted view is that the shrimp and the finfish resources off both the Arabian Gulf and Red Sea coasts are already intensely exploited. The shrimp stocks of the Arabian Gulf may be rehabilitated, as it was in the 1980s, by further reductions of fishing effort, better controls on the taking of small shrimp in shallow water areas by artisanal vessels and prevention of illegal fishing on the main shrimp nursery areas. Like other countries in the region, the catch of some major finfish species (such as grouper) on the Arabian Gulf coast of Saudi Arabia are in decline. Overexploitation may be a contributing factor in this decline (as indicated by fish length or age distributions) as well as changing environmental conditions brought about by coastal development. Cooperative management among all Gulf and Red Sea countries for shared stocks is needed to address the overall management of these regional stocks.

The largest fisheries in Saudi Arabia are shown in Table 1. Although recreational fishing is undertaken in both the Arabian Gulf and the Red Sea areas (particularly from small boats), the sector is not managed and there is no data available on the number of participants or landings:

Total landings have remained static in recent years in Saudi Arabia¹, despite the number of vessels increasing. Table 2 shows the changes, for both the Red Sea and

¹ Although Red Sea landings have declined, this has been compensated for by an increase in landings from the Arabian Gulf area.

Arabian Gulf areas in the landings, the number of artisanal vessels and the number of industrial vessels between 1989 and 2001.

MANAGEMENT ACTIVITY

There are no stated national objectives or goals regarding management of any of Saudi Arabia's marine fisheries and no management plans exist for any of the country's fisheries. As a result, fisheries management tends to be focused on the resolution of existing, short-term problems and issues rather than taking a longer-term, strategic view.

However, Saudi Arabia has introduced a number of management measures to control exploitation of its fishery resources in both the Red Sea and the Arabian Gulf. These controls are all input controls and include:

- Prohibition on the use of explosives, poisons or other harmful substances for fishing.
- Closed seasons for shrimp fishing in the Arabian Gulf (variable but currently from January 1 to August 1 each year) and in the Red Sea from March 1 to August 1. Closed seasons are not based on any formal process or surveys but are generally determined after representations from stakeholders as to the state of the stock.
- Restrictions on artisanal shrimp fishermen to fishing in less than 15 meter depth and also using motors less than 250 hp.
- Closed seasons for important coral reef species of grouper in the Red Sea.
- Mesh size restrictions for gillnets of 2.5 inch mesh in both the Red Sea and Arabian Gulf, apart from nets used for taking sardines, where a mesh size of 1.0 inch in the wings and 0.5 inch in the body of the net is permitted. Artisanal shrimp fishing nets are restricted to 2.5 inch mesh in the wings and 1.0 inch in the body of the net.
- Restricting ownership of artisanal vessels to one per fisherman.
- Mesh size restrictions and limits on the size of industrial trawlers (currently 20 m LOA) in the shrimp fishery of the Arabian Gulf and Red Sea.
- Temporary suspension on the issue of new fishing licenses.
- Establishment of marine protected areas in both the Red Sea and the Arabian Gulf.

All vessels and fishermen are licensed with licensing of industrial vessels being done by the Minister of Agriculture and Water for every investment in excess of 20 million Saudi Rials. For investments less than 20 million Saudi Rials, the licenses are issued by the Deputy Minister for Fisheries Affairs. In addition, all foreign workers on the vessels require permits.

Illegal fishing practices and unlicensed fishing are, however, common and enforcement of regulations is not particularly effective, particularly in the artisanal fishery.

Following the recognition that fishing capacity (particularly the number of fishing vessels) was increasing rapidly without parallel increases in production, the Ministry of Agriculture and Water implemented a temporary suspension on the issue of new artisanal fishing licenses in the late 1990s, thereby introducing a temporary limited entry regime for the artisanal fishery. However, the implementation of the ban on issuing new licenses was not accompanied by any restrictions on the size of replacement vessels. As a result, the building of larger vessels as replacements for existing smaller vessels has accelerated, so that the larger vessels can carry more fishing gear – particularly fish traps. As a result, the temporary suspension on the issue of new fishing licenses in the artisanal sector, while restricting the number of fishing vessels, has not prevented a continuation of fishing effort increases. Unfortunately, no reliable data exists on the extent of these fishing effort increases. Since industrial fishing licenses are issued by either the Minister or deputy Minister (see above) there is no formal policy of license restriction for industrial vessels. However, in recent years, the number of industrial vessels has either fallen (in the Arabian Gulf area from 45 in 1996 to 34 in 2001) or increased slowly (in the Red Sea from 171 in 1996 to 183 in 2001).

In 2002, the Government introduced additional restrictions in the Eastern Province of the Arabian Gulf aimed at controlling fishing effort in the artisanal fishery and enhancing the employment opportunities for nationals in the industry. These included:

- The mandatory requirement that at least one Saudi be present and employed in every boat that is 12 meters long or more.
- A freeze on the issuing of new licenses for artisanal shrimp fishing so that annual licenses are restricted to boat owners who are already in the business. Industrial shrimp fishing was not affected.
- A regulation that artisanal boat owners can only sell their fishing boats after two years from when their licenses are issued.
- A vessel reduction and consolidation program for the artisanal fishery whereby vessel owners are permitted to license new vessels of 12 m or more only by canceling the licenses of two smaller boats.

The regulations were partly in response to the major decline in the number of Saudi nationals employed in the fishing industry in the Arabian Gulf Provinces. This is a different situation than at least some of the Red Sea areas (e.g. Farasan Islands) where the majority of fishermen are Saudi nationals. The immediate impact of the initiatives was that Saudi Border Guards prevented 450 artisanal boats from fishing after the introduction of the new regulations.

In addition to specific fisheries management initiatives, a number of coastal environment rehabilitation projects have been undertaken, including replanting mangroves in both Red Sea and Arabian Gulf areas and the release of fry of sea bream and grouper for restocking purposes.

The industry, particularly the artisanal fishery, receives significant Government subsidies in the form of soft loans, grants and other assistance. These are provided to upgrade the capabilities of traditional vessels, and in the past, have been applied to programs such as the mechanization of traditional fishing vessels. At the present time, virtually all artisanal vessels are mechanized.

Stakeholder participation in the development of fisheries policy and management measures is through traditional discussions, often directly with the local senior representative of the Ministry of Agriculture and Water.

Research that is undertaken on marine fisheries is rarely directly focused on management issues but is more often designed to provide background biological information on the stocks. Such research on wild capture fisheries is carried out by major Universities, such as the King Fahd University of Petroleum and Minerals in Dammam and by the Marine Fisheries Department of the Ministry of Agriculture and Water. Many fisheries and marine environment projects are undertaken by the Universities in collaboration with major Saudi companies (particularly Saudi Aramco) and international agencies. Fisheries aspects in the Red Sea are also being addressed by the major Red Sea and Gulf of Aden Environmental Strategic Action Program which is a Global Environment Facility (GEF) project being jointly executed by the World Bank, UNDP, and UNEP through the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA), based in Jeddah, Saudi Arabia.

Fisheries statistics are collected, interpreted and published by the Ministry of Agriculture and Water and, for the period 1993-1998, the Japanese International Co-operation Agency (JICA) provided support for the Ministry's fisheries statistics collection program.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No separate data is freely available within the Saudi Arabian Ministry of Agriculture and Water on the costs that are directly attributable to fisheries management issues.

However, budgets for fisheries management have not changed significantly since the mid-1990s and, in real terms, have probably decreased.

The budget for fisheries management within the Ministry includes, as a major component, the costs of subsidized services and direct subsidies to the fishing industry.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Saudi Arabia ratified the UN Convention on the Law of the Sea (UNCLOS) in 1996 but has not ratified the UN Fish Stocks Agreement or the UN Compliance Agreement.

Issues such as the Code of Conduct for Responsible Fisheries have not been specifically incorporated into national legislation, but are used as a reference point for fisheries regulations.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

The Regional Fisheries Commission (RECOFI) was formed in 1999 as a result of a resolution of the 117th Session of the FAO Council and succeeded the IOC Committee on for the Development and Management of the Fishery Resources of the Gulfs (the Gulfs Committee). RECOFI has met twice, the last time in Oman in 2003 although there have been several *ad hoc* meetings arranged between member countries, most notably on management of shrimp resources and on aquaculture.

To date, RECOFI members have prepared background status reports for RECOFI Sessions on management of shrimp resources and on aquaculture in their respective countries. However, RECOFI is yet to agree on or to take initiatives in any aspect of regional fisheries management and has not yet addressed co-ordination of fisheries management, statistics collection or research between member countries and/or for shared stocks. The Commission does not yet have Working Groups to progress issues between Commission session meetings (which are currently held every two years), and is therefore wholly reliant on the part-time Secretariat to pursue Commission issues in the interim period between formal Session meetings. As a result, RECOFI is yet to realize its full potential as a regional coordinating body for fisheries management.

Saudi Arabia adopted the Agreement to form RECOFI on 3rd November 2000 and has participated fully in the two RECOFI sessions that have been held and in its various *ad hoc* meetings.

Because RECOFI has not yet initiated any regional actions on fisheries management, research or statistics collection, Saudi Arabia, therefore, has not been required to address the issue of incorporating regional fisheries management issues into its national legislation.

However, the capability exists within Saudi Arabian fisheries legislation to implement many (but not all) fish stock conservation and management initiatives that may emanate from RECOFI in the future. There is, nevertheless, no legal requirement within the national legislation for regional fisheries management issues to be adopted although, by adopting the Agreement in November 2000 to establish RECOFI, Saudi Arabia has provided implicit endorsement that it would do so.

SUMMARY AND CONCLUSIONS

The landings from the marine fisheries of Saudi Arabia have remained steady at around 40 000 tonnes since the mid-1980s. However, fishing capacity has increased rapidly during this time, particularly in the Red Sea area, resulting in catch rates for most fisheries being significantly lower than the 1980s. By contrast, over the longer term

(1989-2001), landings have increased in the Arabian Gulf area although in more recent years, these landings have also stabilized and, in select fisheries (particularly the shrimp fishery) have declined. In addition, as noted earlier, the number of fishing vessels operating in the Arabian Gulf may not be a reliable guide to fishing effort in recent years because of the incentives to replace existing vessels with larger ones during the period of the temporary ban on the issue of new licenses.

The long term control of fishing capacity, particularly in the Red Sea area would therefore seem to pose a significant and important challenge for the management authorities. This is a particular issue because of the traditional support for expansion and development of the Saudi-owned businesses (including subsidization) that operate in both the artisanal and industrial fisheries. To move from this environment to one of restriction and containment of these businesses will be difficult, but, in the long term, necessary.

Since many of the stocks that are exploited commercially by Saudi fishermen are regional in nature, regional co-operation with neighboring countries in management will also need to be developed. At the present time, the regional fisheries commission (RECOFI) is not able to effectively support or implement such regional co-operation although RECOFI has an important potential role to play in such regional management activities.

Finally, like other countries in the region, coastal development in both the Arabian Gulf and Red Sea areas appear to be adversely impacting coastal fisheries resources. These developments therefore need to be taken into account in developing a broader based approach to fisheries management in the Kingdom, which will necessarily include fishing capacity control.

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APPENDIX TABLES

Current management of marine capture fisheries in Saudi Arabia

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	75%	Nil	95%	Increasing
Regional	n/a	n/a	n/a	n/a
Local	n/a	n/a	n/a	n/a

n/a = not applicable

Use of fishery management tools within the three largest fisheries in Saudi Arabia

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Industrial shrimp	Yes	Yes	Yes	No	Yes	No	No	No	No
	Industrial trawl	Yes	No	Yes	No	Yes	No	No	No	No
Artisanal	Arabian Gulf artisanal	Yes	No ¹	Yes	Yes	Yes	No	No	No	No
	Red Sea artisanal	Yes	No ²	Yes	Yes	Yes	No	No	No	No
Recreational	Only small recreational fisheries	No	No	No	No	No	No	No	No	No

1. Apart from a closed season for shrimp

2. A closed season is in place for some reef species only (such as grouper) in the Red Sea.

Costs and funding sources of fisheries management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Industrial shrimp	No	Yes	Yes	No	No	No
	Industrial trawl	No	Yes	Yes	No	No	No
Artisanal	Arabian Gulf artisanal	No	Yes	Yes	No	No	No
	Red Sea artisanal	No	Yes	Yes	No	No	No
Recreational	Only small recreational fisheries	No	Yes	Yes	No	No	No

Compliance and enforcement within the three largest fisheries in Saudi Arabia

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Industrial shrimp	No	No	No	No	No	
	Industrial trawl	No	No	No	No	No	
Artisanal	Arabian Gulf artisanal	No	No	Yes	Yes	Yes	
	Red Sea artisanal	No	No	Yes	Yes	Yes	
Recreational	Only small recreational fisheries	No	No	Yes	No	No	

Capacity management within the three largest fisheries in Saudi Arabia

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Industrial shrimp	No	Yes	Constant	Yes ¹	Improving economic performance
	Industrial trawl	No	Yes	Constant	No	
Artisanal	Arabian Gulf artisanal	Yes	No	Decreasing	Yes ²	Limiting fishing effort
	Red Sea artisanal	No	Yes	Constant	Yes ²	Limiting fishing effort
Recreational	Only small recreational fisheries	No data but probably yes	No	No data	No	

1. The capacity reduction program in the industrial shrimp fleet was a voluntary and commercial decision taken by Saudi Fisheries Company

2. A freeze on the issue of new artisanal licenses is in place for both the Red Sea and Arabian Gulf. In addition, the Arabian Gulf artisanal fisheries have a boat replacement policy in place in which vessel owners are permitted to license new vessels of 12 m or more only by cancelling the licenses of two smaller boats.

Country review: Sudan

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September 2004

INTRODUCTION

The Sudan has an area of 2 505 825 km² (approximately 8.3 percent of the African Continent) and lies between the geographical coordinates 15 00 N and 30 00 E. This vast country embraces different vegetation patterns reflecting various climatic zones grading from tropical rain forests in the south through semi tropical savannah to arid zone in the extreme north with annual rainfall ranging between 1 600 mm and 25 mm in the same sequence.

Sudan borders nine countries with a total land boundaries of 7 687 km and has a population of 35 079 814 and an annual growth rate of 2.8 according to the year 2000 estimates. Agriculture (including fisheries) dominates Sudan economy contributing 80 percent of the total working force and 42 percent of the GDP. The contribution of fisheries in GDP is currently marginal.

In 1989, Sudan adopted a Federal Government System. Accordingly, an administrative structure of 26 autonomous States was established. The Sudanese coast lies within the Red Sea State. This state has an area of 214 458 km² of which 55 percent is pastoral grounds, 42 percent is saline and desert areas and 3 percent is cultivable lands. Coastal populations rely mainly on the sea for their food security and income generation in such an area with limited alternatives livelihood opportunities.

Sudan is endowed with diversified surface and under ground water resources and arable lands that are qualified to support to a vigorous capture fisheries and aquaculture. Currently, capture fisheries activities are centered around the River Nile and its tributaries and the territorial waters of Sudan on the Red Sea.

Sudan marine finfish fisheries account for about seven percent of total fish potential of the country (140 000 tonnes/year) and contributes 8.8 percent of the total production (57 000 tonnes).

From its geographical characteristic, the Red Sea is considered as a tropical water course with a prevailing desert and semi-desert climate. The jurisdiction of Sudan on the Red Sea is limited to a coastline of some 750 km and an Exclusive Economic Zone of 91 600 sq. km of which 22 300 km² constitute the shallow coastal area.

Sudan territorial waters are generally characterized by weak currents, lack of upwelling phenomenon, weak tide (1-2 feet), high water temperature (20 degrees in February and 33 degrees in August), high salinity, (39-45 percent) lack of permanent rivers and freshwater runoff except the freshwater reaching the sea seasonally from Baraka River forming Delta Towker in the south and rain water that influx through valleys and ephemeral khors such as Arbaat in the north and Khor Kilab, Khor Moug, Hoshiery Valley and Khor Nawarat south of Port Sudan. These basic characteristics are believed to have their negative impact on productivity and organic production of the Sudanese sector of the Red Sea. These same territorial waters are rich in intensive coral formations in the inner and outer continental shelf. Although these corals represent attractive feeding localities and refuge areas for coralline fish as well as resorts for tourism activities, they also constitute obstacles to bottom trawl fishing due to their irregular beds.

Mariculture constitutes a potential avenue to augment fish production from capture fisheries for local consumption and export. Emphasis has been historically placed on oyster cultivation targeting production of oyster shells for export as raw material for button manufacturing, cosmetics, medicinal and inlay works. Technologies for oyster cultivation from spat collection to market size stages have been developed and implemented in small-scale oyster family farms adjacent to human settlements in the northern sector of the Sudanese coast. These technologies need to be further disseminated for expansion of this lucrative business along the entire Sudanese coast. Over and above, there are other indigenous finfish and crustacean species that proved elsewhere to be qualified and feasible for cultivation in land-based structures (ponds, pens, and lagoons) or floating cages in the open water. Diversification and intensification of mariculture is a research and development area that accord high priority in government policies for proper resource utilization for food security and socio-economic enhancement.

Sudan Marine Fisheries is small-scale and artisanal in nature, as defined as a labour intensive fisheries that is conducted by artisanal craftsmen whose level of income, mechanical sophistication, quantity of production, fishing range, political influence, market outlets, employment and social mobility and financial dependence keep them subservient to the economic decisions and operating constraints placed upon them by those who buy their production.

As of yet, no industrial and or recreational fisheries have emerged. The limited number of 20 tonnage capacity foreign trawlers that frequent the territorial waters usually operate on seasonal basis mainly targeting shrimps and discarding the by-catch.

The information contained in this review are gathered from various sources including records of the Fisheries Administration and Fisheries Research Centre, FAO Publications, Previous Assignments prepared by the author of these reports to FAO (FAO Fisheries Country Profile; <http://www.fao.org/countryprofiles/>) and PERSGA (ICZM Plan), National Strategy Documents, local conference papers and personal communication. Detailed supportive specific data and figures pertaining to management of marine fisheries are provided in a completed version of a 53 page FAO Questionnaire.

POLICY FRAMEWORK

Sudan policy, at large, is directed towards achieving international standards in the following areas:

- Legal reform to be compatible with international trade and safety agreements and establishment of public sector regulatory bodies.
- Economic reform to achieve progressive liberalization and promotion of parastatal commercial enterprises.
- Reform in the services sector (e.g. transport, health, education, public awareness, etc.) which build capacity for development.

In 2002, Sudan launched its long-term national strategy entitled the Quarter-Century Strategy (2002-2027) that incorporates fisheries development and rational utilization. With regard to fisheries and aquaculture, the strategy states the following seven guiding objectives:

- The role of fish resources in poverty alleviation, food security and welfare of the people.
- Rational utilization, conservation and development of fisheries and aquatic resources through sustainable management of production, restocking of depleted resources and pollution control.
- Increase of productivity and efficiency of fishers and producers through research, technology development and transfer, training and capacity building.

- Development and strengthening of competitiveness of fisheries products through improvement of marketing facilities and quality control.
- Investment incentives and privatization.
- Participation of stakeholders in management and development processes.
- Strengthen databases and documentation.

The policies and implementation and enforcement mechanisms adopted within the strategy to attain these seven objectives include:

- Institutional and legislative reforms.
- Strengthening of coordination mechanisms between the public and private sectors at the central and state levels within the country.
- Establishment and development of fishers and producers organization.
- Promotion of fish producers and fisheries investors through stimulating easy-term credit systems.
- Harmonization of market access and trade facilitation activities.
- Staff recruitment and training.
- Allocation of financial resources for fisheries research and development to public institutions.
- Establish and maintain professional links and relations with relevant regional and international institutions.

LEGAL FRAMEWORK

The following are examples of direct and indirect legislations related to marine fisheries:

Marine Fisheries Ordinance 1937

This ordinance was launched on 15 June 1937 to regulate the marine fisheries. The ordinance was a very modest administrative and technical guideline reflecting the available knowledge and expertise available at the time. The main rules specified in this ordinance are:

- No craft shall be employed for the purpose of fishing in territorial waters unless a valid license, hereinafter referred to as a fishing craft license, shall have been issued under this ordinance in respect of such craft.
- No person shall engage in or be employed in fishing in territorial waters unless he is to be a holder of a valid permit hereinafter referred to as a fishing permit, issued under this ordinance for such purpose.
- Fishing craft licenses and fishing permit under this ordinance shall be issued by the local authority on payment of the fees set out in Schedule II here to, and unless previously forfeited or otherwise determined shall expire on the 31st day of December next following.
- The Governor General may, for the better consideration and development of fisheries, by order published in the Sudan Government Gazette, declare any part of territorial water to be a closed area.
- No person shall fish in a closed area otherwise than for the sole purpose of sport unless he has previously obtained the permission in writing of the local authority.
- The local authority may grant such permission subject to such terms and conditions as he shall think fit and may refuse such permission at his discretion and without assigning any reason.
- Every Police officer, customs officer, or other person duly authorized in that behalf by the local authority may, for purpose of enforcing this ordinance or any regulation made hereunder:
 - Board and search any craft found in territorial waters or any craft which he has purpose continuously from territorial water into the high seas and which

he, on reasonable grounds, suspects to have been employed for the purpose of fishing in territorial waters; Required any person on board any such engaged in or employed in fishing in territorial waters or whom he, on reasonable grounds, suspects to have been so engaged or employed to exhibit his fishing permit, apparatus and catch.

- Where there is reasonable suspicion in the case of any such craft that an offence has been committed, take the alleged offender, the craft, apparatus, and catch without summons warrant or other process to the nearest or most convenient police station or post. The craft and apparatus may be detained pending trial and the catch may be sold and the proceeds of the sale impounded.
- Any person who acts in contravention of or / to fails to / comply with any of the provisions of this ordinance shall be guilty of an offence against this ordinance and shall be liable to a fine not exceeding 50 pond or to imprisonment for a term not exceeding three month or to both such fine and imprisonment.
- The Court may also order the confiscation of any craft apparatus or catch employed in the commission of, derived from any offence under this ordinance and the cancellation of or suspension for such time as the Court thinks fit or endorsement of the date and nature of the offence on a fishing craft license issued in respect of any such craft or any fishing permit issued to any person guilty of any such offence as aforesaid.

1975 by-law

On 15 April 1975 a by-law was issued by the Minister of Agriculture Food and Natural Resources (where Fisheries at that time was under the ministries mandate) and published as supplement No 1175 (in Arabic) in the Sudan Government Gazette. In this by-law, a slight amendment of the Marine Fisheries Ordinances was made whereby a new item was added dealing with banning use of water guns, fishing of certain fish resources and aquatic pollution. According to this amendment no body is allowed to:

- use water guns in fishing without an issued permit;
- fishing or collecting corals or molluscs or ornamental fishes without an issued permit;
- dumping pollutants in water or coastal area.

It goes without saying that the Marine Fisheries Ordinance (1937) and its By-law are old-dating and demand radical amendment to accommodate recent development in management concepts and procedures and benefit from the international boom of legal and administrative development and initiatives.

Other Legislations

The following are examples of other Sudanese legislations indirectly relating to marine fisheries and environmental management:

- Marine Act 1961
- Territorial Waters and Continental Shelf Act 1970
- General Regulation & Control of Merchant Shipping 1971
- Petroleum Act 1998
- Regulation for the Protection of the Environment in the Petrol Industries
- Environment Protection Law, 2000
- Oil Pollution Contingency Plan, 2004

The organs and mechanisms directly involved in fisheries management are the Fisheries Administration, the Fisheries Training Institute (Ministry of Animal Resources and Fisheries) and the Fisheries Research Centre (Ministry of Science and Technology) according to the mandate of these ministries specified in relative Presidential Decree of their establishment.

According to Sudan federal government system, there are structural arrangement for fisheries administration at the federal and states levels.

The Fisheries Administration within the Ministry of Animal Resources is the central fisheries authority entrusted with planning, policy formulation, training and overall supervision of the fisheries sector. This administration is answerable to the Undersecretary of the Ministry. It is formed of three main divisions: namely Capture fisheries, Aquaculture and Conservation.

At the state level, Fisheries Administration structures are under the umbrella of the Director General of the State Ministry of Agriculture who is answerable to the State Minister of Agriculture. There are currently 12 fisheries administration structures in the states endowed with fisheries resources out of the 26 federal states of Sudan including the Red Sea State.

This current Fisheries Administration discharges its mandatory obligations from its headquarters and associated structures based in Khartoum in close coordination with its Marine Fisheries Department in Port Sudan (Red Sea State) and with other relevant public and private sector institutions and agencies.

The Fisheries Training Institute in Khartoum is one of the specialized training facilities within the Ministry of Animal Resources and Fisheries. It provides short-term training courses targeting fisheries officers and fishermen from the public and private sectors. Fisheries extension services are coordinated with the Extension Administration within the Ministry of Animal Resources and Fisheries.

The Fisheries Research Centre, on the other hand, is the main applied research body which is under the umbrella of the Animal Resources Research Corporation, Ministry of Science and Technology. The Fisheries Research Centre HQ is in Khartoum and performs its mandatory functions through a number of specialized Capture Fisheries and Aquaculture Research Stations geographically distributed in strategic fisheries resources localities. The Red Sea Fisheries Research Station of this centre in Port Sudan caters for the marine environment.

Other collaborative institutions and support mechanisms include the following:

- **Local Universities and Higher Learning Institutions.** There are over 26 government universities and 40 private sector universities and colleges in Sudan. Several of these higher learning institutions deliver and offer undergraduate and graduate courses and degrees in fisheries and aquatic environment sciences.
- **The Fisheries Consultative Council.** This council was formed by the Minister of Animal Resources and Fisheries several years ago as a coordinating and advisory structure within the Ministry with representation from the concerned public and private institutions and agencies. The forum benefits from expertise of a wide spectrum representation of eminent university and research institutions staff, planners, extension personnel fisheries societies and trade unions. The council meets at least twice a year and submit to the minister a report of their deliberations and recommendations. The suggestions of the council are usually adopted but are not mandatory binding to the Minister.
- **The Higher Council for Environment and Natural Resources,** Ministry of Environment and Physical Development acting as a national focal point for issues, programmes and conventions of environmental concern.
- **Local and Foreign NGO's** e.g. Marine Conservation Society, Sudanese Environmental Conservation Society, OXFAM, ACORD.
- **Regional and International Organizations** e.g. FAO and its subsidiary bodies. UNDP, ODA, IDRC, PERSGA.
- **Major Stakeholders** including fisheries companies and firms, Fisheries Trade Chamber, fishermen unions and cooperatives, and fish and shellfish farmers. Special meetings, workshops and extension programmes are periodically organised and consultative services are rendered to them.

STATUS OF THE FISHERIES

Despite the high biodiversity of aquatic life, exploitation emphasis has been historically placed on harvesting finfish, shrimps and wild molluscs. Both activities are largely of traditional and subsistence nature. The other highly valued resources are either untapped or occasionally fished.

As for finfish, fishing activities are carried out by the artisanal sector using traditional gear, craft and fishing techniques and frequenting near shore areas. Investments in commercial fisheries are limited in magnitude with a tendency to increase in recent years using small and medium-size trawlers and purse seiners. Some firms are engaged in collection and marketing fish through different forms of production relations with local fishermen. Cartilaginous fishes include 30 species of sharks and 21 species of skates and rays. The reported bony fishes amount to 280 species. However, 60-70 percent of the finfish catches are attributed to *Epinephallus aerolatus*, *Lutjanus bohar*, *L. gibbus*, *Lethrinus* spp., *Caranx* spp., *Plectiopus maculatus*, *Aprion* spp., *Scomberomorus commersoni* and *Mugil* spp. Estimates for finfish potential in the Sudanese waters are rather discordant ranging between 6 000 and 35 000 tonnes/year as proposed by stock assessment studies at different times. However, for precautionary approach measures, a fish potential figure of 10 000 tonnes/year is adopted. Of this, the current annual finfish landing did not exceed 5 000 tonnes.

Diving in search of wild molluscs is an old dating occupation for the majority of coastal population. Molluscs of commercial importance include *Pinctada margaritifera*, *Trochus dentatus*, *Strombus*, *Lambia*, *Chicorus*, *Fasciolaria* and *Sypraya* spp. The first two species contribute to over 90 percent of the wild mollusc collection which is exported to Europe as raw material for button manufacturing, cosmetics and inlay works. Other species such as *Strombus*, *Lambia* and *Tridachnia* are also fished for local market as souvenirs or use of the shell and meat as ingredients in poultry feed and local perfume production. The available production statistics that need updating suggest a total annual landing of 500 tonnes of *Trochus* spp., 30 tonnes of *Pinctada* spp., 600 pieces of *Strombus* and 500 kg of *Lambia* spp.

Crustaceans belonging to the families *Penaedae*, *Palinuridae* and *Potunidae* have been reported in coastal waters. Eight shrimp species have been reported in the coastal waters that are fished by local inhabitants along the coast or by bottom trawling by local and foreign vessels. Of these, *Penaeus semisulcatus*, *Penaeus latisulcatus* and *Metapenaeus Monocerus* contribute the highest population density. Non stock assessment studies have been carried out to quantify these resources. Statistics on shrimp catches are rather discordant suggesting an estimate not exceeding 20 tonnes/year.

The coral reef population in Sudan represent a unique and highly regarded national heritage that deserves utmost attention to preserve. This constitutes a potential asset for tourism industry. The fish resources associated with the coral formations and their vicinity can contribute, apart from food security, in supporting a vigorous ornamental fish industry. There are three types of coral reef in the Sudanese waters including the fringing reef, barrier reefs and atolls. Sanganab atoll. (35 km northeast of Port Sudan) has been declared since 1990 as an internationally recognized Marine National Park. Management of this park is the main responsibility of Environmental and Wildlife Protection Force of the Ministry of Interior. Two other potential marine reserve areas have been surveyed and identified in Makoar Island and Dongonab Bay (approximately 176 km north of Port Sudan). Administrative and legal steps pertaining to their official declaration are underway. In these areas the threatened Dugong, Sea Turtles, Sharks, Manta Ray and resident and migratory birds such as Osprey, Goliath, Heron, white-eyed gull, Sandpipers and Crab Plover have been reported.

There are other living marine resources that are either untapped or sporadically fished.

Apart from fragmentary studies on finfish, no stock assessment data and basic information are available for these resources. Much of the research emphasis was placed on oyster biology and culture technologies. Several alternative hanging and bottom culture systems have been evaluated and tested in pilot farms. Based on that, a programme of establishing small oyster family farms was launched with financial support from the Ministry of Agriculture, Animal Resources and Irrigation of the Red Sea State, OXFAM and ACCORD.

Seven fishing zones have been recognized and exploited within Sudan Territorial Waters. These are:

- **Bays, Inlets and "Merssas"**. These are single channel, bilobate and trilobate water bodies more or less perpendicular to the coast line and extending inland for 1-5 km with water depth ranging between 15 – 100 fathoms. This zone is famous for Sardine and *Siganus* sp.
- **Coastal Boat Channels** extending for some half a mile from shore with a depth of approximately three fathoms and harbours mullet milk fishes and *Lethrinus* spp.
- **The fringing reefs** paralleling the coast at a distance of 1-2 miles inwards. Important fishes such as *Cranx*, *Litharinus* *Plectropomas* are fished from this zone
- **Deep Boat Channel** with a depth ranging between 40-200 fathoms and famous for fishing of Aprion and sharks.
- **Outer Barrier Reefs** within the continental edge in which fishes such as *Lutjanus bohar*, *L. gibbus*, *Variola louti* are predominant.
- **Pelagic zone** of over 300 fathoms in depth occupied by Agus, *Cranx*, Mackerel, Tuna and others.

A limited number of trawlers are used in coastal and offshore fishing. Fishing gear in use include surrounding nets, seine nets, gillnets, cast nets, handline, hook and line and limited number of trawl nets used in seasonal bottom and mid water fishing.

The irregular sea bed confined trawling operations to an area of 71 000 hectares in Delta Toaker (29 500 hectares), Gulf of Agieg (6 500 hectares) Mersa Mogadam (3 000 hectares) Khor Nawarat (2 000 hectares) and other areas.

There are 1 800 registered local fishermen operating 410 fishing crafts including 3-5 meter dugout canoes (Houris), 5-7 meter wooden and steel boats (Felucca) and 7-10 meter lunches (Sambouk). The majority of the Houris is manoeuvred by wooden oars and bamboo staff while the other fishing vessel are fitted with outboard or inboard engines ranging between 10 and 100 horsepower. Over and above, there are some 50 medium size wooden boats and steel trawlers of capacities in the tune of 20 – 25 tonnes each most of them operate on seasonal basis. Trawling is performed by a limited number of small size trawlers in confined areas in southern and northern parts of the Sudanese Red Sea and mainly of seasonal nature targeting shrimps, lizard fish, goat fish and threadfin bream.

Cultivation of the black-lip mother-of-pearl shell, *pinctada margaritifera*, is the form of mariculture practiced in Sudan. The systems adapted for oyster cultivation are based on off- bottom and bottom culture techniques. Culture operations were geared towards production of oyster shells for export as raw material for button manufacturing, cosmetics and inlay works. The industry is predominantly based on oyster family farms along the Sudanese coast on the Red Sea, as well as large investment in the area of artificial pearl production.

The marine environment and fisheries have been observed to be apparently subject to various hazards and risks that demand high priority attention. Some of these negative impacts are cited below:

- Overfishing of and stress on some component of fisheries resources as a consequence of improvement of fishing gears and techniques (e.g. overexploitation of historical locations for wild oyster collection in Dongunab Bay and Mohamed Goal area in the north coast and Suakin Archipelago in the south).

- Illegal fishing performed by unlicensed foreign vessel and smuggling of catch.
- By-catch and discards of untargeted fish which is thrown back to the water particularly by shrimp trawlers and its negative economic and environmental impacts.
- Use of illegal fishing methods (e.g. dynamite) by foreign fishermen or fishing during the breeding season.
- Destruction of coral community stands and dredging of fishing grounds in the process of construction of new ports (e.g. Bashayr Petroleum Port, rehabilitation of Suakin Port and Ooseif Port).
- Deterioration of coastal environment through cutting of mangroves and blocking of natural water courses from reaching the sea by the fast pace of industrial and economic development.
- Oil pollution

MANAGEMENT ACTIVITY

Management measures stem from research recommendations and directives and guidelines of FAO and relevant institutions.

The Fisheries Administration is the mother institution entrusted with implementation of the various aspects of fisheries management in collaboration with public and private sector institutions and agencies. However, contribution of stakeholders in planning and implementation of management programme is currently at a low key profile.

Management is currently focussed on finfish, crustaceans (shrimps, prawns and lobsters) and molluscs. However, most of the management efforts were directed towards finfish. Management capabilities and discharge reflect relative progressive development particularly during the last five years. The reasons behind this progress are increased recognition of the sector and respective political will, human resources capacity building and exchange of expertise with regional and international fisheries agencies and bodies.

Current Fisheries Management Tools and Trends

Management Goal and Objectives as expressed in the Comprehensive National Strategy (1992-2002) called for

- Rational utilization and conservation of marine living resources.
- Protection of the marine environment from pollution and ecological degradation.
- Promotion of investment.
- Development of rural communities.
- Improve fish distribution and marketing.
- Coordinate efforts for integrated coastal management at the national, regional and international levels.

Technical measures in use include:

Regulation of Access: licensing local fishermen and fishing crafts and issuing special permits for foreign vessels subcontracted with Sudanese counterparts. It must be mentioned, however, that the issued licenses to artisanal fishers and craft give them the right to fish throughout the year within the territorial waters (e.g. open access regime). As for the foreign fishing boats, permits are given with clear specification of the fishing zone, season and fisheries resource targeted. No catch quota is conditioned at the moment for both categories.

Mesh Regulation: Standard mesh size of fishing gear is recommended. Check on these is performed during routine inspection and illegal nets are confiscated.

Fish Size Regulation: Minimal allowable size limits for the most important fishes are specified and declared to fishers. Undersized fish are usually confiscated.

Banning of certain fishing methods: The law prohibits the use of dynamite, poisons, and spear guns in fishing.

Increase of Fishermen Capacity: Training, extension, improvement of fishing boats, establishment of boat and engine maintenance workshops, and supply of other services are examples.

Closed Areas: Fishing is completely forbidden in Saganab atoll as a conserved Marine National Park. Dongonab Bay is a closed area for oyster farming and small-scale fishing and wild oyster collection by the local inhabitants.

Closed Season: This is applicable to shrimp grounds where fishing is not allowed during the period mid March to mid August coinciding with the breeding season.

ICZM: Recently (2004), an Integrated Coastal Zone Management (ICZM) Plan has been prepared by national experts under the umbrella of the Strategic Action Programme (SAP) of PERSGA. The assignment incorporates two complementary parts: a detailed background coastal profile documents and the proposed ICZM plan of action. This plan is geared towards vertical and horizontal coordination of efforts among various stakeholders in the private and public sectors at the state and federal levels for rational use, conservation and sustainable development of the coastal area. The draft of this ICZM had been discussed in two workshops in Port Sudan (January, 2003) and Khartoum (July 2003). A final workshop is planned to convene in Port Sudan on 6-7 October, 2004 before submission of the ICZM plan to the Cabinet of Ministers and legislative bodies for approval. The ICZM Implementation Programme is planned to start with the following activities:

- Capacity building for the ICZM Council and the ICZM Secretariat (provision of basic equipments and training).
- Preparation of the “Land Use Map” and Planning of the Sudanese Coastline;
- The establishment of the “Public Participation Center for the ICZM” as a mechanism for communication and information dissemination to be hosted by an NGO based in Port Sudan.
- Establishment of GIS/Remote Sensing/data base center in Port Sudan that should be connected with the main center in Khartoum.
- Training and Capacity Building (including the preparation of training kits that consist of trainer manual as well as trainee materials on Environmental Impact Assessment, Tools of ICZM, Public Participation and ICZM, Communication and negotiation skills and other related topics and implementation of training courses).
- Conduct socio-economic study to measure the impacts of ICZM on poverty reduction.
- Prepare fund raising plan for all other projects suggested.
- A coordination unit for ICZM Implementation Programme should be established and provided locally with in kind contribution such as working place and communication tools. PERSGA will cover all the expenses of a part time consultant in addition to part time administrative staff to coordinate all technical and financial issues of the programme.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

As mentioned earlier, several institutions are involved in fisheries management in one way or another. The Fisheries Administration and Fisheries Research Centre are directly involved in fisheries management and perform their responsibilities within the available budget and financial support from the Federal and State Governments and other donors. There is no contribution of magnitude from the private sector apart from fishing permit fees. Public and private universities contribute indirectly through capacity building and basic research.

Due to lack of proper records, it was practically impossible for the author to reach actual figures for the overall budget and exact management costs. The available

records of the Fisheries Administration and Fisheries Research Centre indicate a general increase in their budgets during the last ten years for finfish and crustacean management while that for management of wild molluscs fishing remained more or less unchanged. Sources of revenue are limited to license fees, penalties and income tax which is applicable at the moment to fish exporters and importers while traditional craftsmen are exempted from income tax. Generally speaking, estimation of the budget, costs and revenues during the last ten years took into consideration the Inflation factor and devaluation of the Sudanese currency.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

As of yet, Sudan did not sign, ratify or accedes the Fish Stock Agreement or the Compliance Agreement. However, informally some of the principles, guidelines, and directives of the FAO Code of Conduct for Responsible Fishing were taken into consideration when preparing the strategic plan of the country.

As mentioned, Sudan had prepared in 2003 the Integrated Coastal Zone Management Plan in collaboration with PERSGA which when approved will contribute to rational management and sustainable development of the marine fisheries and its environment.

Currently, Sudan participates in the following agreements:

- UN Law of the Sea: signed 1982/ratified 1985
- Jeddah Convention for the protection of the environment of the Red Sea and Gulf of Aden: signed 1982/ratified 1985
- Biodiversity Convention: signed 1992/ratified 1995
- CITES Agreement: signed and ratified 1982

PARTICIPATION IN REGIONAL FISHERY BODIES

Sudan participates in the following regional bodies:

- FAO/IOTC: Full member, participating in the regular annual meetings of the Scientific Committee and the Commission
- FAO/CIFA: Full member
- FAO/ INFOSAMAK: Attending meetings and communicating information
- PERSGA: Participating as national working group members in the implementation of the Strategic Action Programme (SAP)
- AOAD: Collaborating in Fisheries Studies and receiving assistance in capacity building (workshops & training programmes)

There are two legal mechanisms in place to implement measures, agreements and technical guidelines adopted by regional fishery bodies.

Mechanism I: Recommendations stemming from regular meetings, technical consultations or involuntary guidelines are brought to the attention of the central government through technical reports with recommendations from the representative(s) who attended the scientific forum. Within the Fisheries Administration (Ministry of Animal Resources and Fisheries) and Fisheries Research Centre (Ministry of Science and Technology), the expertise gained and recommendation reached in these meetings are as far as possible adopted to improve performance. Seminars are usually organized to disseminate information and recommendation of these regional and/or international meetings.

Mechanism II: Agreements and Protocols are usually submitted to the Cabinet of Ministers by the concerned Minister for approval as a prerequisite for subsequent signature, ratification, accession and implementation. The procedures involve several steps:

- Evaluation of the proposed document by the concerned Sector Ministerial Committee of the Council of Ministers.
- Review of the comments and recommendations of the Sector Ministerial Committee by the Council of Ministers to decide general approval or otherwise.

- If approved, submission of the document to the Attorney General Office of the Ministry of Justice for legal opinion.
- Submission of the agreement or Protocol to the National Assembly as the highest ranking legislative organ for final approval or enacted by presidential decree in the absence of the National Assembly as the case may be.

SUMMARY AND CONCLUSIONS

Sudan Marine Fisheries is exclusively of artisanal in nature. As of yet, no proper industrial and or recreational fisheries have emerged.

Monitoring, intervention and evaluation as basic functions of fisheries management are rather sporadic and intermittent and handicapped by limited financial resource allocation, inadequate capacity building and poor internal and external coordination.

National Fisheries legislations are old-dating and require considerable reforms and amendments to cope with the recent developments in the international arena.

There is much to be done to improve fisheries management for food security and socio-economic sustainable development.

Evaluation and synthesis of the current situation of Sudan marine capture fisheries and mariculture depict, among others, the following problems and constraints that need to be addressed and resolved:

- Very poor resource database as a consequence of insufficient monitoring, surveillance and control infrastructure, allocation of resources and limited qualified personnel, a situation that handicapped proper planning and investment backstopping.
- Insufficient infrastructure and institutional capacities.
- Weak coordination and cooperation between the concerned research and administration authorities and other stakeholders which is largely motivated by personal attitudes rather than institutional commitment and mechanisms.
- The poor organization of fishers and their low socio-economic status has limited their political influence and effective participation in the development process
- The remoteness of the fishing areas from the fish landing and marketing sites coupled with rudimentary and insufficient facilities for fish preservation and handling has their negative impact on fish quality.
- Extension, training and public awareness programmes are either lacking or poorly attended to.
- Fisheries legislations need considerable revision and amendment to cope and match with local constitution and international laws and conventions.
- Inadequate access of fisheries research and management personnel to regional and international forums and abroad training that limited their expertise.
- Insufficient Credit Schemes for fishermen communities and small scale investors.
- Limitation in financial resources allocation and timely payments.
- Inadequate extension, transfer of appropriate technologies and innovations and community participation.
- Poor implementation of strategy and plan of action for fisheries development and integrated coastal management
- Insufficient foreign technical assistance and financial support from donors and relevant institutions and agencies.

REFERENCES

- FAO. 2002. Country Profile for Sudan (available at <http://www.fao.org/countryprofiles>)
- PERSGA. Sudan Integrated Coastal Zone Management Plan. <http://www.persga.org>.

APPENDIX TABLES

Current management of marine capture fisheries in Sudan

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	30	60	50	increasing
Regional	60	40	50	
Local	10	0	0	

Summary information for three largest fisheries (by volume) in Sudan (2002)

Category of Fishery	Fishery	Volume million tonnes	Value* million US\$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan? (Yes/No)	# of Participants	# of Vessels
Artisanal	Finfish	0.50	34.3	47.6	96.9	yes	1 500	410
	Shrimps	0.02	0.6	1.9	1.7	yes	200	50
	Molluscs	0.53	0.5	50.5	1.4	yes	100	100

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

Use of fishery management tools within the three largest fisheries in Sudan

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Artisanal	Finfish	Yes	No	Yes	Yes	Yes	No	No	Yes	No
	Shrimps	No	Yes	Yes	Yes	Yes	No	No	Yes	No
	Molluscs	No	No	No	No	No	No	No	No	No

Costs and funding sources of fisheries management within the three largest fisheries in Sudan

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Artisanal	Finfish	Yes	Yes	Yes	Yes	No	No
	Shrimps	Yes	Yes	No	Yes	No	No
	Molluscs	Yes	No	No	No	No	No

Compliance and enforcement within the three largest fisheries in Sudan

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Artisanal	Finfish	No	No	Yes	Yes	No	Market Checks
	Shrimps	No	No	Yes	Yes	Yes	Market Checks
	Molluscs	No	No	Yes	Yes	No	Market Checks

Capacity management within the three largest fisheries in Sudan

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Artisanal	Finfish	No	No	increasing	No	-
	Shrimps	Yes	Yes	decreasing	No	-
	Molluscs	Yes	No	decreasing	No	-

Country review: United Arab Emirates

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January 2004

INTRODUCTION

The United Arab Emirates has coasts that border both the embayment-like Arabian Gulf and also a smaller coastline that borders the more oceanic Gulf of Oman. The country consists of a federation of seven Emirates and administrative and political power is shared, to a greater or lesser extent depending on the portfolio, between the Federal Government and the various Emirates.

The sea area and coastline of the UAE that borders the Arabian Gulf is characterized by extreme meteorological and hydrological conditions with water temperatures reaching over 35°C during summer months (air temperatures of over 50°C), very high evaporation rates and high salinities. Seasonal variation in hydrological parameters is also high with water temperatures varying from around 18°C in winter to 35°C in summer. As a result, a significant number of the fish species found in the Gulf waters of the UAE utilize this area on a seasonal basis, often for spawning, although some major species are found in the area throughout the year.

By contrast the East Coast of the UAE which borders the Gulf of Oman is much more oceanic in nature with hydrological parameters exhibiting much smaller seasonal variation. However, this coastal and sea area is small in comparison with the Gulf coast of the UAE.

All fisheries in the UAE are artisanal in nature with no large scale industrial fisheries being undertaken¹. Recreational fishing (mainly from boats) is growing in popularity with a small charter boat fleet developing to take sport fish such as large pelagics (including sailfish) and demersal species. Although vessels are owned by UAE nationals, the majority of workers on the vessels are from India, Bangladesh and Iran.

In general, the management of fisheries in the UAE is rudimentary although it has developed in recent years from a state of no management. Although fisheries are insignificant from an economic point of view in the UAE, they are often seen as being of heritage value since the early economy (pre-1960) of the UAE very much depended on fishing and trading activities.

Recent estimates² show that fish stocks, both commercial and non-commercial, have declined significantly (by as much as 90%) in UAE waters over the past 25 years. The reasons for this decline are not known although extensive and rapid coastal development in the UAE may be implicated. As a result, the number of vessels registered is decreasing and, in 2002, was 5 191, down from 7 700 in 1998. An estimated 17 264 fishermen operated these vessels. However, of these registered vessels, only a small number (perhaps as low as 20%) actually undertake fishing operations. Recent laws requiring a UAE national to be physically present on vessels during fishing operations has also reduced the number of active vessels.

¹ Four purse seine vessels operate out of Sharjah and take anchovy, sardines and other small pelagic species at night, using light attraction. However, this activity is seasonal and landings are not significant.

² Fisheries Resources Assessment Survey project undertaken in 2001/02 by the Environmental Research and Wildlife Development Agency (ERWDA).

The management and rehabilitation of the UAE's fish stocks therefore poses significant problems for the national management authority, a task that is not made easier by the need to share such management with regional authorities and the lack of any explicit management planning process for any fishery.

POLICY FRAMEWORK

The national, or federal, authority with responsibility for fisheries management is the Ministry of Agriculture and Fisheries (MAF), although regional (i.e. Emirate-based) authorities also have some legislative authority for policy development within individual Emirates. The basic national fisheries legislation in the UAE is contained in Fisheries Law 23 of 1999 with the flavor of that Law being very much concerned with fisheries administration. The overall policy objectives of fisheries management in the UAE are not explicitly stated within Law 23.

Being a confederation of seven Emirates, both legislative and policy frameworks for fisheries management reside at both national and at regional (i.e. Emirate) levels although few formal co-ordination mechanisms are in place. Fisheries Regulation Committees, which comprise representatives of the MAF, Fishermen's Co-operatives, Municipalities and the Coast Guard exist in each Emirate and they usually meet monthly. Their task is to address regional fisheries policy and enforcement issues. However, there is no overall national strategic planning process that guides the activities of these committees and no co-ordination between the Committees. This results in either differing policy and enforcement decisions between committees or, often, no action at all. Informal co-operation, however, is strong and this ensures that overall fisheries management policy issues are generally consistent between national and regional authorities. At the regional level, fisheries management is often influenced indirectly through environmental or other legislation. However, these legislative instruments enable individual Emirates to adopt and implement fisheries management regulations that may be specific to their area of jurisdiction.

As an example of regional legislation, the law that establishes the Environmental Research and Wildlife Development Agency (ERWDA) in Abu Dhabi not only recognizes ERWDA as the competent authority for managing fisheries in that Emirate but also emphasizes the protection and conservation aspects of ERWDA's role. As a result, Abu Dhabi Emirate, which is by far the largest Emirate in the country, has regulations (such as the requirement for escape panels in fish traps) that are unique to that Emirate. The smaller Emirates, where such regional authorities are not as well developed, rely more heavily on federal authorities for both fisheries policy and administration.

Local Municipalities undertake administration of fisheries-related infrastructure, such as the important local fish landing sites, fish markets and Fishermen's Co-operatives. Again, informal co-operation between these authorities and federal and regional authorities is strong with, for example, federal and regional data collectors using local facilities to collect data on landings.

The requirement to develop fisheries management plans is not contained in either federal or regional legislation and no fisheries management plans currently exist for any fishery. As a result, policy directions for management of individual fisheries are not explicit and are often subject to change through political or administrative influences. However, a major policy platform, contained in federal legislation, is the provision of subsidies or subsidized services to fishermen. These subsidies take the form of either payment of compensation for various types of loss (fishing gear, catch, etc.) or the provision of free or heavily subsidized services such as motor repair. A large proportion of the Ministry of Agriculture and Fisheries budget is directed towards such subsidies. Because fisheries management legislation is relatively new at both the federal and regional level, no comprehensive review of legislation has yet been undertaken.

International fisheries issues are the responsibility of the federal Ministry of Agriculture and Fisheries. However, regional co-operation is weak or virtually non-existent, both on a bilateral basis and through mechanisms such as the Regional Commission on Fisheries, RECOFI. The UAE has not ratified the UN Convention on the Law of the Sea (UNCLOS), the UN Fish Stock Agreement nor the FAO Compliance Agreement.

LEGAL FRAMEWORK

Responsibility for fisheries management in the UAE lies, at the federal level, with the Ministry of Agriculture and Fisheries (MAF) although regional environmental authorities (particularly in Abu Dhabi Emirate, which is by far the largest and controls around 60% of UAE's waters) are also recognized through regional environmental legislation as being the competent authority for managing fisheries within their jurisdiction. Such regional jurisdiction usually extends from the shore to the limits of UAE territorial waters within the coastal limits of the Emirate.

Although the jurisdiction for fisheries management is shared between federal and regional authorities, there are no legislative requirements in place that require co-ordination in management. However, Fisheries Regulation Committees established under the Federal Law 23 of 1999 exist in each Emirate and these bring together various federal and regional authorities concerned with fisheries management and administration. There are no other formal co-ordination mechanisms between federal and regional authorities although informal co-ordination is strong. As a result of this and also the weakness of the Fisheries Regulation Committees, there are instances where fisheries management regulations for the same fishery differ between Emirates with the larger and more active Emirates (particularly Abu Dhabi Emirate) being a particular example. Many of the smaller Emirates rely on the federal authority (MAF) for fisheries management policy and assistance with implementation and, as a result, management processes and measures tend to be more consistent across these smaller Emirates.

The basic national fisheries legislation in the UAE is contained in Fisheries Law 23 of 1999 that addresses the national role in fisheries management and allocates responsibility for implementation to the Ministry of Agriculture and Fisheries. A range of other legislation impacts on fisheries management outcomes within the country with regional environmental legislation being particularly important within Abu Dhabi Emirate. Such legislation in Abu Dhabi provides for the regional environmental authority (Environmental Research and Wildlife Development Agency, ERWDA) to be the competent authority for managing fisheries within the Emirate and, as a result, fisheries management is undertaken within the context of marine environmental protection. This has inevitably led to an increasing focus on the broader, ecosystem issues of fisheries and their management.

Even in those Emirates where regional environmental authorities are not active in fisheries management issues, environmental legislation (both federal and regional) impacts on fisheries legislation through processes such as the creation of marine protected areas.

Local legislation regulating coastal development and the operation of fisheries infrastructure, such as ports, markets, landing sites etc, also impacts significantly on fisheries management legislation. The coastal development legislation and processes is particularly important in impacting on fisheries resources and their management, given the extensive coastal development that is occurring in the UAE.

STATUS OF THE FISHERIES

The fisheries of the UAE are entirely artisanal in nature, with the minor exception of four small purse seine vessels that operate seasonally from Sharjah and take sardines and anchovy at night using light attraction.

Two types of vessels are used in the artisanal fishery: wooden, local dhows up to approximately 15 m in length that primarily operate fish traps ('gargoor') and fiberglass, outboard powered vessels up to 8-10 m in length (locally known as tarads) that use a variety of gear including fixed and floating gillnets, hand trolling and drop lines and gargoor. The gargoor fishery is the largest single fishery in the UAE, accounting for around 79% of landings by weight. The most important species taken in this fishery are Emperors (25%), Groupers (24.7%), Jacks (16.5%), Sweetlips (10.5%) and Scads (5.2%).

In addition to vessel catches, there are a number of fixed stake nets (locally known as 'hadra') that are located along the coast and its inlets. Rapid coastal development has apparently reduced the number of such stake nets in areas near to major cities such as Dubai. However, they are still numerous in areas where little coastal development has taken place, particularly in the area west of Abu Dhabi where 73 such stake nets were recorded in 2003³.

The pelagic catches are dominated by Spanish mackerel (*Scomberomorus* spp.) and other large pelagics while small pelagic species such as *Sardinella* spp. and anchovies are captured in inshore waters (by beach seines and set nets) near Ras al-Khaimah and also on the East Coast near al-Fujairah. Apart from the four small purse seine vessels that operate seasonally from Sharjah, there is no industrial fishery for small pelagic species although there have been several attempts to start such an industry in the past. Recent research and surveys have indicated that, while small pelagic stocks in UAE waters exceed 100 000 t, their seasonality and small school size makes large-scale commercial exploitation difficult.

A small quantity of high value tropical rock lobster (*Panulirus ornatus* and *P. versicolor*) is taken on the East Coast of the country and sold locally. However, the dominant lobster in the market is *P. homarus* that is imported in significant quantities (often illegally) from the Sultanate of Oman.

The majority of the catch from all sectors is taken from Abu Dhabi Emirate, since this Emirate comprises over 65% of the sea area of the United Arab Emirates. However, the most productive areas are inshore areas near to the Straits of Hormuz, around Ras al-Khaimah. Landings probably also consist of fish taken in other, neighboring, countries' waters, although the quantity of such landings is not known.

No trawling takes place in the UAE since this has been banned since the 1970s in an effort to protect marine habitat. Although the use of driftnets is also prohibited, their illegal use is common, particularly during the season for large pelagics such as Spanish mackerel.

Because of the design of the market-sampling program, there appear to be some major issues of over-reporting of landings in the UAE⁴. Recent, improved, landings surveys undertaken in Abu Dhabi Emirate (which comprises the majority of the landings in the UAE) have shown that an estimated total of 8 184 tonnes of fish was landed in the Emirate during 2002, 88% of which consisted of demersal species⁵. This compares with official reported landings for the whole UAE of around 110 000 t. As a result, the actual landings in the UAE in 2002 were probably no greater than 20 000 t of which the fish trap (gargoor) fishery comprised the majority (about 79%) with the gillnet and stake net (hadra) fishery also being important.

In 2002, the UAE completed the first comprehensive survey and assessment of its demersal and small pelagic resources. The results of the survey were compared with a similar survey undertaken in 1978 and showed that while small pelagic stocks were

³ Unpublished study undertaken by ERWDA.

⁴ This is currently being addressed following an agreement in 2004 between the MAF and ERWDA to initiate an improved system of the collection of fisheries statistics for the UAE.

⁵ Unpublished study by ERWDA.

at about the same level as in 1978, demersal stocks had declined significantly, in some areas to around five percent of 1978 levels.

Of the demersal stocks, both commercial and non-commercial species had declined significantly and the study concluded that fishing was probably not the only factor in the cause of this decline. Extensive coastal development and rapid urbanization since 1978 may also have played a role since the study showed these UAE Gulf coastal waters were a significant spawning area for many demersal fish species.

The results of that survey also showed that the majority of commercial demersal fish species were being taken at a size that was well below the optimum size. The lack of regulation of numbers of fishing vessels or fishing gear also had resulted in fishing effort levels being higher than optimum levels.

Although reliable catch and fishing statistics are not available, commercial catch rates have apparently fallen significantly over the past decade, particularly in the important fish trap (gargoor) fishery. Without restrictions on the number of gargoor that can be used, the commercial response to this has been to increase the number of gargoor used. In the light of the findings of the recent survey, restrictions are now being introduced to control fishing effort (through limiting the numbers of fishermen and quantity of fishing gear) and to regulate the size of capture (through mesh size restrictions).

Apart from small pelagic resources, the fish stocks of the UAE are apparently fully or over-exploited. As a result, there seems little prospect for further major development of the current industry. Further, the declines in abundance of demersal fish stocks, perhaps contributed to by coastal development and urbanization, do not provide a sound basis for further development of the industry.

Although presently lightly exploited, the development of an industry for small pelagic species in UAE waters may be difficult because of both the small school size and also the market competition from low-cost neighboring producers such as the Sultanate of Oman.

Individual Government and private-sector initiatives within some Emirates have moved significantly towards the development of a series of artificial reefs within their area of jurisdiction. Such developments are designed to increase fish abundance in the area.

Recreational fisheries are of increasing importance in the UAE with both big-game fishing for large pelagic species such as Spanish mackerel and sailfish and demersal fishing becoming increasingly popular. However, although there are requirements in both Dubai and Abu Dhabi Emirates for recreational fishers to be licensed⁶, there is no data on quantity of catches or any reliable data on the number of participants.

The three largest fisheries in the UAE, all of them artisanal, are shown in Table 1. Landings are estimated landings, based on the recent studies of ERWDA, and therefore differ from officially reported landings. As noted above, the officially reported landings are likely to be significantly over-estimated.

TABLE 1
Characteristics of the major fisheries of UAE

Category of Fishery	Fishery	Volume tonnes	Value* USD million	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan? (Yes/No)	# of Participants	# of Vessels
Industrial	Purse seine	Est. 25	No data	100	100	No	Est. 28	4
Artisanal	CFT	15 800	\$33.6	79.0	76.0	No	13 750	4 100
	Gill	3 600	\$9.3	18.0	21.0	No	3 100	934
	Stake	600	\$1.3	3.0	3.0	No	73	Nil
Recreational	Large pelagic	No data	No data	No data	No data	No	No data	No data
	Demersal	No data	No data	No data	No data	No	No data	No data

* Value in 2002 U.S. Dollars.

⁶ The enforcement of the recreational licensing requirement is, however, not particularly effective.

MANAGEMENT ACTIVITY

The UAE has moved from a situation of no management of its fisheries prior to about 1999 to one where rudimentary management measures are now in place. All commercial vessels and fishermen are licensed although there has, until recently, been no restriction on the granting of fishing licenses to nationals. However, in 2003, Abu Dhabi Emirate introduced a freeze on the issue of new commercial vessel licenses (along with other management measures) and federal authorities (MAF) followed this lead later in the same year. As a result, there is now a freeze on the issue of new commercial fishing licenses throughout the UAE. Fishing licenses for recreational fishing were also introduced in 2003.

Initially there were no gear restrictions for commercial fishing, apart from the total ban on trawling activities, which had been in place since the 1970s, and a ban on driftnets. However, in recent years, a limit of 100 fish traps (gargoor) per vessel has been introduced in 2003 in Abu Dhabi Emirate although no gear restrictions currently apply to other Emirates. The two measures of a freeze on issuing new licenses and a limit on the amount of gear per vessel has effectively put a ceiling on fishing effort in the fish trap fishery of Abu Dhabi Emirate. Limitations on fishing capacity⁷ were further addressed in 1999 when the MAF introduced a requirement for a UAE national to be actually on board each fishing vessel that was undertaking fishing activities. This resulted in an immediate reduction in the number of active vessels and landings⁸ although these impacts were only temporary and landings and activity levels had, by 2004, returned to pre-1999 levels.

Despite these advances, significant latent effort exists in the fish trap fishery since only a small proportion of registered vessels (about 20%) are currently active. To address this latent effort situation, the UAE is examining ways of removing inactive vessels from the fleet.

All UAE management practices rely on input controls and no fishery is managed by output controls, such as catch quotas. Closed areas, which are often marine protected areas designed to protect endangered species such as dugong, are an important component of fisheries management measures in the UAE. In addition, there are closed seasons for some migratory pelagic fish. No size limits are imposed on commercial fish species although Abu Dhabi Emirate have recently introduced a requirement whereby fish traps need to incorporate a biodegradable grid in each trap. This grid both acts as an escape gap, allowing small fish to escape, and as a preventative measure to 'ghost fishing' should the trap be lost. Such 'ghost' fishing is perceived as a significant issue, not only in the UAE but in the region generally. However, little information is available either on the numbers of lost fish traps⁹ or their impact on fish stocks.

The enforcement of management measures is carried out by the MAF, regional authorities such as ERWDA and by the Coast Guard. However, the effectiveness of enforcement activities is limited by a number of factors, including little fisheries-specific training for Coast Guard staff, the lack of a strategic approach to enforcement activities (including no use of intelligence gathering) and, most importantly, the traditional right of appeal for misdemeanors directly to Ministers and Sheikhs. As a result, very few fisheries prosecutions are pursued or are successful and regulations are commonly ignored. The effectiveness of enforcement measures, however, is improving as the country addresses these issues.

⁷ This also was designed to address the issue of over-dependence on imported labor, mainly from the Indian sub-continent and the use of fishing vessel ownership as a means of obtaining 'labor permits' for the importation of manual workers.

⁸ ERWDA, unpublished information from catch sampling.

⁹ The 2001/02 fisheries resources survey undertaken by ERWDA estimated, based on the 'catch rate' by trawling of discarded fish traps, that there were approximately 76 000 discarded fish traps in UAE waters.

No formal management plans exist for any fishery although most fisheries (the stake net fishery is an exception) are subject to some form of management arrangements. In the absence of management plans, however, these management arrangements are not implemented within a strategic context and management objectives often remain unclear.

Stakeholder participation in the development of fisheries policy and management measures is through traditional discussions, often directly with the Minister or other senior Government figure. In general, these often result in compromise solutions. Such stakeholder participation is limited to nationals only, who are the vessel owners and may or may not be actively engaged in fishing. The expatriate workers on the vessels are not involved in such dialogue on management measures.

As a result of the move from no management to a rudimentary management structure, the number of stocks under management has increased over the past ten years. However, none of the stocks under management undergo formal and regular assessment to determine their status.

The recent comprehensive resource survey in 2001/02 showed that there had been marked decreases in the abundance of both commercial and non-commercial demersal stocks over the past 25 years. Pelagic stocks generally were at about the same level. Therefore, although no formal assessment of the status of stocks is made on a regular basis, it would appear as if demersal species may (at current effort levels) be either over-exploited or at best fully utilized. By contrast, the small pelagic resources are underutilized although practical issues such as the small school size may hinder their commercial development.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No separate data is maintained within the UAE's Ministry for Agriculture and Fisheries on the costs that are directly attributable to fisheries management issues. However, over the past ten years, budgets for fisheries management has certainly increased as the Ministry moved from no management to rudimentary management. In recent years, however, (2000-2003), the budget for fisheries issues has stagnated and may have even have been declined.

A significant part of the fisheries budget within the Ministry of Agriculture and Fisheries is utilized for the payment of subsidies, or the provision of subsidized equipment to fishers. These subsidies are often at the discretion of the Minister and, apart from programs such as subsidized motor repairs, are often *ad hoc* in response to specific requests from fishers. The budget for research services for the operation of the Ministry's Marine Resources Research Centre at Umm al-Quwain is also included within the MAF's fisheries budget. However, much of the research is orientated towards aquaculture activities, although some stock enhancement is carried out, primarily the annual release of small numbers of fry of rabbitfish (*Siganus caniculatus*) into coastal waters.

Compliance is undertaken both by the Ministry of Agriculture and Fisheries (mainly port inspections) and by the Coast Guard, who undertake at-sea inspections. Again, no separate accounting of compliance and enforcement costs is maintained within the Ministry of Agriculture and Fisheries. At-sea enforcement by the Coast Guard is also not accounted separately since fisheries-related issues are generally attended to during regular sea patrols for other purposes.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

The United Arab Emirates has not ratified the UN Convention on the Law of the Sea (UNCLOS) nor the UN Fish Stocks Agreement nor the UN Compliance Agreement.

Although the Ministry of Agriculture and Fisheries are aware of the content of initiatives such as the Code of Conduct for Responsible Fisheries, the provisions of this, or other initiatives, have not been incorporated into national legislation.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

The United Arab Emirates is an active member of the Regional Commission on Fisheries (RECOFI) and participates in most of the meetings and working groups of the Commission. However, there is no real commitment to regional fisheries management by members of RECOFI and, as a result, the Commission has not yet addressed regional fisheries management initiatives.

As a result the UAE has not been required to incorporate regional fisheries management issues into its national legislation.

There is, however, no legal requirement within the UAE fisheries legislation for fisheries management issues that may be adopted by RECOFI (or other regional body) to be incorporated into national legislation.

The Gulf Co-operation Council, through its meetings of Agriculture Ministers, often considers fisheries issues at national levels but has not yet been active in pursuing regional fisheries initiatives.

SUMMARY AND CONCLUSIONS

The UAE has only, in recent years, introduced legislation to manage its fisheries, with the primary legal instrument (Federal Law number 23) coming into force in 1999. The country has therefore moved, within a few years, from a position of no management to one where rudimentary management measures are in place. However, there remains a significant amount to be done, both legislatively and from a management perspective.

Perhaps the greatest challenge is to bring together the various legislation contained in federal and regional (i.e. at the Emirate level) environmental, fisheries and other statutes into a comprehensive, consistent, national fisheries law. Both practical and political obstacles make this a difficult task.

The fisheries of the UAE have apparently declined over the past 25 years, particularly the inshore demersal stocks. Given the rapid development and urbanization of the UAE (with most development being concentrated in coastal areas), coastal development and reclamation may be implicated in this decline. Faced with this major decline in its most important fisheries sector, the UAE therefore needs to address its fisheries management issues quickly to both better understand the resources and to bring them under management.

Recent initiatives by the Ministry of Agriculture and Fisheries (MAF), such as imposing a freeze on the issue of new commercial fishing licenses, is encouraging and may point to a commitment to manage the UAE's fisheries in a sustainable way. However, the apparent shared nature of many stocks with other countries in the region may limit the effectiveness of such national action in fisheries management.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries in United Arab Emirates

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	75	0	30	Increasing
Regional	75	0	30	Increasing
Local	n/a	n/a	n/a	n/a

Use of Fishery Management Tools within the three largest fisheries in United Arab Emirates

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Purse seine	No	No	Yes	No	Yes	No	No	No	No
Artisanal	Fish trap	Yes	No	Yes	No	Yes	No	No	No	No
	Gillnet	Yes	Yes	Yes	No	Yes	No	No	No	No
	Stake net	No	No	No	No	Yes	No	No	No	No
Recreational	Large pelagic	No	No	No	No	Yes	No	No	No	No
	Demersal	No	No	No	No	Yes	No	No	No	No

Costs and Funding Sources of Fisheries Management within the three largest fisheries of United Arab Emirates

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Purse seine	No	Yes	Yes	No	No	No
Artisanal	Fish trap	No	Yes	Yes	No	No	No
	Gillnet	No	Yes	Yes	No	No	No
	Stake net	No	Yes	Yes	No	No	No
Recreational	Large pelagic	No	No	Yes	No	No	No
	Demersal						

Compliance and Enforcement within the three largest fisheries in United Arab Emirates

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Purse seine	No	No	Yes	No	Yes	
Artisanal	Fish trap	No	No	Yes	Yes	Yes	
	Gillnet	No	No	Yes	Yes	Yes	
	Stake net	No	n/a	No	No	n/a	
Recreational	Large pelagic	No	No	No	No	No	
	Demersal	No	No	No	No	No	

Capacity Management within the three largest fisheries in United Arab Emirates

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Purse seine	No	No	No data	No	
Artisanal	Fish trap	Yes	No	No data	No	
	Gillnet	Yes	No	No data	No	
	Stake net	No data	Yes	No data	No	
Recreational	Large pelagic	No data	No	No data	No	
	Demersal	No data	No	No data	No	

Country review: Yemen

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July 2004

INTRODUCTION

The Republic of Yemen occupies a key strategic position on the south west of the Arabian Peninsula with extensive coasts bordering both the Red Sea and the Gulf of Aden in addition to important sea areas around Socotra Island and its Archipelago. The length of its coastline is approximately 2 500 km in total with the majority of the population being involved in rural enterprises, particularly in the coastal areas.

Fishing is a major rural enterprise in Yemen with the country depending on the fisheries sector for around three percent of its GPD with some 500 000 people (or approximately 2.9 percent of the population) being directly or indirectly dependent on the fishing industry for their livelihood in 2003. Of this number, there were an estimated 50 000 people directly involved in catching fish. The country possesses significant fish stocks, among them valuable species such as lobster, shrimp and cuttlefish. Prior to unification, the former Peoples Democratic Republic of Yemen (i.e. South Yemen) pursued a policy of encouraging the development of industrial fisheries, often at the expense of the development of the small-scale fisheries sector. By contrast, the Yemen Arab Republic (i.e. North Yemen), with a coast to the Red Sea, pursued a successful policy of small-scale fisheries sector development.

After unification in 1990, a coherent fisheries policy for the country as a whole was lacking and, in addition, supporting institutional infrastructure to allow the development of such a policy (e.g. skilled staff, research facilities, accurate statistics etc.) became severely degraded. As an example, up to 1990, reliable and routine catch and fishing effort data were collected from the industrial fishing fleet as well as, to a lesser extent, from the small-scale artisanal fishery. However, for about a decade after 1991, no dependable fish landings statistics were collected and no reliable resource surveys or stock assessments were undertaken.

However, in recent years, Yemen has begun to address these issues, with assistance from international donors and technical experts from the World Bank, FAO, DANIDA and others. In addition, bilateral technical co-operation with a number of countries (e.g. China, Russia, Japan etc.) has enabled institutional infrastructure to be rebuilt, technical training to be undertaken, strategic fisheries policy to be developed and implemented, export markets to be developed and, generally, the management of the sector improved substantially. The result has been recent substantial increases in both landings and exports with landings reaching an all-time record of around 228 000 t in 2003¹. Most of this increase has come from the small-scale artisanal fishery which has been targeted by the Government for assistance at the expense of large-scale industrial fishing.

However, many problems remain to be addressed. There remain significant concerns about the apparent over-exploitation of some of the most valuable fisheries in Yemen, particularly the rock lobster and shrimp stocks and some demersal fish species. Illegal fishing by industrial vessels, although reduced, is still a major compliance issue and

¹ Ministry of Fish Wealth, Yemen, April 2004.

practices such as finning of sharks are common. The Ministry of Fish Wealth's policy framework, structure and supporting infrastructure is still in the development stages. However, with the major advances that have already been made by the Government of Yemen in moving towards a clear and coherent fisheries development policy, there is confidence that these outstanding issues will be addressed.

POLICY FRAMEWORK

The national authority with responsibility for fisheries management in Yemen is the Ministry of Fish Wealth, which is based in Sana'a and also has regional offices in Aden, Hodeidah and Mukalla. The Ministry also includes ancillary organizations such as the Marine Sciences and Resources Research Centre (MSRRC) in Aden and oversees three public corporations of the National Corporation for Services and Fish Marketing (NCSFM), the Coastal Fisheries Corporation (CFC) and the Yemen Fisheries Corporation (YFC). Of these the NCSFM is the largest and operates about 12 large and smaller cold storage facilities, two tuna canning plants and is also responsible for management of most fisheries harbor facilities in Yemen.

The Ministry has a large staff of over 3 000, most of who are with the NCSFM. The structure of the Ministry, and its functions of being involved in private sector activities such as fish marketing, are essentially a legacy of the political arrangements prior to unification and may not be appropriate for the development of a modern and efficient fisheries sector. However, the Ministry is currently addressing these issues and, in particular, the Government has taken the decision in principle to limit the Ministry's activities in the three public corporations². Privatization of these (and other Government corporations outside the fisheries sector) is being addressed through the World Bank supported National Privatization Project.

The Ministry of Fish Wealth co-operates with other agencies involved in marine issues. In particular, there are three main agencies that have policy input into fisheries and marine management. These are:

- The Environmental Protection Council (EPC), which has a coordinating role for environmental initiatives and has the responsibility for the leadership role in the design of a national marine protected areas systems. The council's base is located in Sana'a with two small branches in Aden and Mukalla. Both branches have limited technical and managerial capacity to deal with marine and coastal zone issues.
- The Public Corporation for Maritime Affairs, which is responsible for maritime pollution and response. The Corporation plays an important role in developing a legislative framework to protect the marine environment and ensuring the integration of oil spill contingency plans into oil spill surveillance, monitoring and enforcement.
- The Regional Convention for Conservation of the Red Sea and Gulf of Aden (PERSGA), which operates as an organizational unit of the Arab League Educational Scientific and Cultural Organisation (ALESCO). PERSGA assists in the co-ordination of regional UNDP environmental programmes, especially under the Global Environmental Facility (GEF), and a Strategic Action Plan (SAP) for protection of the region's marine environment.

As part of these broader policy issues, the Yemeni Government, through the Ministry of Fish Wealth has embarked on a policy direction of reducing industrial fishing (including illegal industrial fishing) and developing the small-scale fisheries sector. As a result of this policy, the contribution of the industrial sector to total landings has decreased over recent years, reaching a low of 13.7 percent in 2003³,

² Fisheries Sector Strategy Note, Report 19288-YEM, World Bank, 14 June 1999.

³ Ministry of Fish Wealth, Yemen, April 2004.

compared with around 50 percent (including substantial illegal catches) in the early to mid-1990s⁴.

The current fisheries sector strategy for Yemen rests on three pillars⁵: i) Fisheries management based on strengthened fisheries statistics, regular fish stock assessment and an expansion of applied fisheries research, ii) gradual withdrawal of the state from its involvement in commercial activities and future focus on provision of an enabling environment through an improved regulatory framework, enforcement of rules and regulations by way of a more effective monitoring, control and surveillance as well as quality control, iii) improvement of coastal infrastructure including the provision of the fishing communities not only with access infrastructure and protected landing sites but also with basic services such as power, water, health and education.

The Ministry of Fish Wealth has, however, encountered difficulties in the past in implementing management policy measures because of the politisation of policy making. In 1999, the World Bank noted⁶ that “The Ministry also lost many of its best staff after unification, and is currently lacking in competence in a number of priority areas, e.g. it lacks managers, scientists, technical and administrative staff. Equally important, in a sector in which political considerations can have extraordinary influence, the political top of the Ministry has been unable to effectively shield its technical administrators from pressures for politically expedient, but technically questionable, decisions”. While problems of both politisation of decision-making and lack of technically qualified staff remain, the situation has improved markedly in recent years in both areas, partly as a result of Government commitment to address the issues and partly as a result of the move to privatization of functions such as fish marketing etc.

Funding for the Ministry of Fish Wealth to undertake its responsibilities comes from annual funding allocations from the Government. Revenues from fishing activities come principally from royalties and fishing license fees, particularly from the industrial fishery. In addition, the NCSFM collects a two percent marketing fee for fish sold through public markets and this contributes to Government revenues. While there is no formal link between the annual revenues received from these sources and the annual funding of the Ministry of Fisheries, in practice the two are usually closely linked.

International fisheries issues are also the responsibility of the Ministry of Fish Wealth. Yemen has bilateral fisheries agreements with Iraq (1977) and Eritrea (1998) although the former agreement has been essentially non-operational since 1990. Yemen is a signatory to both CITES and to the Regional Convention for the Conservation of the Red Sea and of the Gulf of Aden Environment and participates in the activities of these organizations as funds permit. Yemen ratified the UN Convention on the Law of the Sea (UNCLOS) in 1987 but has not ratified the UN Fish Stocks Agreement or the FAO Compliance Agreement. However, it has adopted the FAO Code of Conduct for Responsible Fisheries and its fisheries legislation and practices are broadly based on this Code.

LEGAL FRAMEWORK

The basic fisheries law of Yemen is contained within Law Number 42 of 1991 on Regulating Fishing, Exploiting and Protection of Marine Animals (“The Fisheries Law”). The Fisheries Law was amended in 1997 through the issue of Law Number 43 of 1997 on Amending Some Articles of Law Number 42 of 1991 on Regulating Fishing, Exploiting and Protection of Marine Animals (“The Amended Fisheries Law”).

⁴ Fisheries Sector Strategy Note, Report 19288-YEM, World Bank, 14 June 1999.

⁵ The Minister of Fish Wealth, Ahmed Musaad Hussein in opening the conference on developing a fisheries sector strategic plan, in co-operation with the World Bank and European Commission, Sana’a 2002.

⁶ World Bank Fisheries Sector Strategy Note, Report 19288-YEM, 14 June 1999, p11.

The Fisheries Law and the Amended Fisheries Law define the powers of the Ministry of Fish Wealth and provide for a range of mechanisms to control fishing activities and to protect marine life and habitats. The Fisheries Law also contains the details of the administration of fisheries in Yemen, including the ability to license vessels and fishermen. The Fisheries Law and the Amended Fisheries Law have been further refined a number of times through the issue of Ministry and Cabinet Resolutions which add detail to the basic powers contained in the Fisheries Law. Many of the Resolutions issued between 1991 and 1997 were subsequently incorporated into the Amended Fisheries Law of 1997. Some of the more important of these Resolutions are:

- Presidential Resolutions of 1993 and 1995 issuing implementing regulations for the Ministry of Fish Wealth
- Ministerial Resolution 27 of 1997 establishing a guidance committee for fishing and fisheries management.
- Resolution Number 35 of 1997 of the Ministry of Fish Wealth defining the requirements of fishing vessels and fishing gear.
- Cabinet Resolution 232 of 1997 regulating the fishing, exploitation and protection of shrimp.
- Resolution number 35 of 1998 of the Ministry of Fish Wealth on the regulation of the export of fish and marine products.

The Fisheries Law and the Amended Fisheries Law do not provide for the preparation of management plans for individual fisheries but are, in essence, more development-orientated and include details on the administration of fisheries.

The Fisheries Law and the Amended Fisheries Law identifies the Ministry of Fish Wealth as the responsible agency for managing fisheries in Yemen. The Ministry is therefore responsible for management, research and development and enforcement activities.

Because the Amended Fisheries Law is relatively new, it has not yet been further reviewed or revised, apart from the issue of specific Resolutions that define details of the Amended Law.

STATUS OF THE FISHERIES

Although official reported landings to 2001 have shown a steady increase to around 142 000 t in 2001, reported landings for more recent years have shown a significant increase to 228 100 t in 2003⁷ worth an estimated 212.3 million US\$. With the Government's policy of developing the small-scale fishery sector in preference to industrial fisheries, the small-scale artisanal sector contributed 209 300 of this total while industrial fishing production declined to 18 700 t, from 24 100 t in 2002. Most significantly, exports in 2003 rose 27.9 percent in volume when compared with 2002, to a total of 63 600 t. The increase in export volume has been significantly influenced by Yemen meeting quality standards and gaining approval from the European Commission to export fisheries products to that market.

The status of many of the stocks in Yemen is uncertain, principally as a result of the lack of detailed and recent stock assessment and, more importantly, the lack of reliable statistics after 1990. Adding to the lack of reliable landings statistics is the capture of significant quantities of fish by illegally operating industrial fisheries and their direct transfer to other countries. These direct transfers were estimated in 1999 at up to 40 000 t per annum⁸.

The statistics collection procedures have, however, recently been upgraded and monitoring, control and surveillance activities have been improved. However, as

⁷ Ministry of Fish Wealth, Yemen, April 2004.

⁸ Fisheries Sector Strategy Note, Report 19288-YEM, World Bank, 14 June 1999.

welcome as these initiatives are, both surveillance activities (including prosecution) and the fisheries statistics collection system requires further improvement if reliable assessments of key stocks are to be undertaken in the future.

Despite the shortcomings of the lack of recent stock assessments and the lack of a time series of reliable statistics, there is general agreement among both Ministry of Fish Wealth staff and foreign scientists⁹ as to the status of many of Yemen's fisheries. It is generally agreed that small pelagic resources (which are a shared stock with neighboring countries and consist mainly of sardines, Indian mackerel, chub mackerel and anchovies) are not generally over-exploited, although landings vary from year to year as a result of environmental factors, particularly the influence of the summer monsoons.

By contrast, there are very clear signs of over-exploitation of some high profile resources, although without stock assessment this cannot be confirmed. Catches of important pelagic stocks in the Red Sea, such as Indian mackerel (*Rastrelliger kanagurta*), showed a sharp decline from a high of 7 301 metric tons in 1991 to only 720 metric tons in 1996. Another important commercial species, the kingfish (*Scomberomorus commerson*), has shown steady catches at around 3 500 metric tons since the early 1990s, despite an apparent substantial increase in fishing effort. Some demersal species in both the Red Sea and Gulf of Aden (e.g. the grouper *Epinephelus* spp) are believed to be heavily and probably over-exploited, particularly in inshore reef areas. However, again, no recent or reliable stock assessments are available for this or other demersal species thought to be at risk. The Ministry of Fish Wealth, however, is aware of this deficiency and with the assistance of donors and individual experts, is attempting to undertake assessments of its major stocks. However, any such assessments are hampered by the lack of reliable resource data or landings statistics and fishing effort measures. More recently, the Ministry has explored the possibility of undertaking a comprehensive, fisheries-independent resource assessment of its waters using chartered research vessels¹⁰ and, subject to funding, such a survey may be undertaken in the near future.

In the Red Sea area, sharks are mainly caught for their fins, which are exported and fetch high prices on international markets. Intensive fishing effort and the use of gillnets brought shark catches in the Red Sea to a peak of 6 537 metric tons in 1993. Despite increases in fishing effort and an expansion in the number of shark species being landed, landings have declined since that time to around 5 500 t in recent years.

Of all the stocks, the valuable fishery for the rock lobster (*Panulirus homarus*) appears most vulnerable, both on the east coastal areas of the Gulf of Aden (to the Oman border) and in the waters around the Socotra Archipelago. Landings virtually collapsed to near zero in the late 1990s from peaks of around 400 t in the early part of the decade. This collapse was attributed to the widespread use of nets rather than traps to capture lobsters (resulting in many under-sized and egg-bearing animals to be taken) as well as increasing and unregulated fishing effort. Illegal entry of unregistered and unlicensed boats put further pressure on the stocks. Although landings have recovered a little in recent years, they remain 70–80 percent below earlier peaks with illegal fishing and export common. Enforcement capacity in the fishery remains inadequate.

The Red Sea shrimp resources (and, to a lesser extent, the smaller Gulf of Aden resources), which is based mainly on *Penaeus indicus* and *P. semisulcatus*, appear to have suffered as a result of heavy exploitation by both industrial and artisanal fisheries as well as from some unlicensed activities. Estimates of sustainable catches¹¹

⁹ For example, as reported in Sanders and Morgan (1989)

¹⁰ Personal Communication to author, Ministry of Fish Wealth, November 2003

¹¹ Ministry of Fish Wealth report, 1998, World Bank Fisheries Sector Strategy Note, Report 19288-YEM, World Bank, 14 June 1999

TBBLE 1

Summary of characteristics of major industrial and artisanal fisheries

Category of Fishery	Fishery	Volume (Est. in tonnes)	Value* US\$ million	% of Total Volume Caught	% of Total Value Caught	Covered by a Management Plan? (Yes/No)	# of Participants (Est.)	# of Vessels (Est.)
Industrial	1. Demersal trawl	Est. 11 500	Est. \$9.5	61.5	56.5	No	780	131
	2. Cuttlefish	Est. 7 200	Est. \$7.3	38.5	43.5	No	Included in (1)	Included in (1)
Artisanal	1. Demersal	Est. 24 050	Est. \$39.8	11.5	20.4	No	49 000	9 900
	2. Pelagic	Est. 183 350	Est. \$147.0	87.6	75.2	No	Included in (1)	Included in (1)
	3. Shrimp	Est. 1 900	Est. \$8.6	0.9	4.4	No	Included in (1)	Included in (1)

* Estimated Value in 2002 U.S. Dollars.

in the Red Sea, based on independent assessments, have ranged from 500 to 1 400 t per annum. While reported catches have been significantly less than this for the past decade, landings increased to around 1 200 t in 2001¹². The shrimp fishery has been the attention of significant management attention and closed seasons, gear restrictions and closed areas are in place. However, with the increase in reported catch (probably a more accurate reflection of actual catches than in the past), the resources may be being exploited beyond the maximum sustainable yield estimated previously.

Exploitation of cuttlefish (*Sepia pharaonis*) in Yemen has been primarily an industrial fishing activity and began in former Peoples Democratic Republic of Yemen (PDRY or southern Yemen) waters in 1967, continuing in 1970 with Japanese trawlers¹³. These operations lasted until 1980-81. In addition, from 1972 to 1984, a joint Yemeni-Soviet Fishing Expedition caught cuttlefish and deep sea lobsters. Increasing and unregulated fishing effort, combined with intensive trawling on spawning aggregations, led to overfishing and a major decline of the fishery by 1982-1983, with reported annual landings falling from around 9 000 t to 1 500 t. With the re-unification of Yemen in 1990 and a decrease in industrial fishing activity¹⁴, reported landings began to recover after 1997, reaching 9 300 t by 2001. If the Government's commitment to curtail industrial fishing is continued, then an increasing share of the cuttlefish catch will be taken by the artisanal fishery, which will bring additional complications of adequate surveillance and enforcement of regulations.

The Socotra Archipelago, which was declared a marine protected area in 1996, is an important part of fisheries activities in Yemen. Resource surveys made in the late 1960s and 1970s reported rich fishery resources in the waters surrounding the Archipelago. Kesteven and others (1981), from findings of the RV Dr. Fridtjof Nansen in 1974 and 1976, estimated biomass for demersal resources in the area at 55 000-116 000 metric tons and pelagics at 112 000-224 000 metric tons with yield estimates of 10 000- 20 000 and 39 000-78 000 metric tons, respectively. Fish, turtles and lobsters are important resources in the Archipelago and abalone is a potential resource for future exploitation.

In summary, the status of the major fish stocks in Yemen is generally uncertain because of the lack of reliable assessments and also a poorly developed statistics base. These two issues are, however, being addressed by the Government. Despite the lack of data and assessments, there is a general consensus that some major stocks may be over-exploited, in particular the lobster, shrimp, cuttlefish and some demersal species. There is not the same level of concern about the level of exploitation of small pelagic species. With the recent (2003) significant increases in reported landings to over 228 000 t¹⁵, the concern over over-exploitation of major fish stocks in Yemen can only increase.

¹² FAO Yearbook of Fisheries Statistics, Yemen, 2004. Part of the reason for the increase in reported landings may have been better reporting to include catches that were previously taken by unlicensed vessels.

¹³ PERGSA Country Reports, 2002.

¹⁴ However, illegal fishing by foreign industrial trawlers remained a major problem throughout the 1990s.

¹⁵ Although some of this increase may reflect the improving fisheries statistics collection system, rather than real increases in landings.

A summary of the characteristics of the major industrial and artisanal fisheries in Yemen in 2003 is given in Table 1. There are no significant recreational fisheries and no data are available.

MANAGEMENT ACTIVITY

The principles and goals of fisheries management are contained within the Fisheries Law and the Amended Fisheries Law. These two basic laws (together with subsequent specific Ministerial and Cabinet Resolutions) also enumerate the types of management activities that are permitted. These are:

- closed season and closed areas;
- prohibited fishing method and gear and specification of gear that may be used (including the mesh size of nets); and
- the species, sizes and other characteristics of fish and other aquatic organisms that it is permitted or forbidden to catch.

These powers under the Fisheries Law and the Amended Fisheries Law are implemented in different ways for different fisheries.

For example, the important fishery for large and small pelagic fisheries (which comprises the largest component of artisanal fishery landings and therefore the largest component of total landings in the country) has few management regulations. There are no restrictions on large pelagic fishing (apart from the need for vessels and crew to be licensed) while there are minimal gear restrictions on the fishing of sardines in the Hadhramaut (implemented through Resolution 26 of 1998) including the prohibition on the use of purse seine nets at night and during some months. With such minimal management intervention, it is perhaps not surprising that the pelagic fisheries are not only the largest in Yemen but also the sectors that are growing the most rapidly.

Demersal artisanal fisheries are, likewise, lightly regulated while industrial demersal fisheries (which are mostly demersal trawlers) have the following requirements:

- Industrial fishing vessels must operate beyond five miles of the coast in the Gulf of Aden and the Arabian Sea and beyond six miles of the coast on the Red Sea;
- Discarding of fish is not permitted;
- Two or more observers must be on board each industrial vessel;
- Mesh size of demersal trawl nets should be not less than 75 mm in the cod end and nets must be single layered.

The cuttlefish, shrimp and lobster fisheries are the most regulated in Yemen with the following regulations being in place:

- Closed seasons for shrimp (1 May to 30 August each year for coastal areas), cuttlefish (1-30 May and 16 August to 30 September) and lobster (30 March to 31 October). Closed seasons for lobsters and shrimp have recently been extended.
- Gear quantity restrictions in the lobster fishery where the number of traps is limited to 60 per vessel.
- Size limits for lobsters of 19 cm total length and a prohibition on the taking of egg-bearing lobsters.
- Prohibition on the taking of egg-bearing lobsters.
- Gear type restrictions for lobster (restricted to traps only) and shrimp (restricted to trawl nets).

Monitoring, control and surveillance activities, while improving, are not effective and illegal fishing is common. In particular, illegal fishing practices in the lobster fishery is very common because of its remote and small-scale nature and includes fishing with bottom-set nets, the taking of undersize lobsters, the taking of egg-bearing lobsters and fishing during the closed season. Unlicensed fishing by large industrial vessels has been a major problem in the past but is slowly being brought under control.

Stakeholder participation in the development and enforcement of fisheries policy and management measures is generally minimal at national level¹⁶ but important at village level, often through the mechanism of influential local fisheries co-operatives. As noted above, the capability of collection of robust fisheries statistics from both the industrial and artisanal fleets is being restored after a ten year hiatus following unification in 1990 and this will provide the basic data for future fisheries and stock monitoring. More comprehensive, but basic, fisheries research is undertaken periodically by the MSRRC, usually with assistance from aid agencies or through bilateral arrangements.

In 2003 and 2004, the Ministry of Fish wealth has acted to curtail the activities of the industrial fishery sector, including increased surveillance of territorial waters to deter illegal fishing. This illegal fishing, particularly by Egyptian and other vessels has been a particular problem in the past for Yemen. In addition, the Ministry began law suits to recover an estimated five million US\$ in past license fees owing from a number of industrial fishing companies.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

With fisheries development and management processes now being re-developed after the disruptions following the 1990 reunification of Yemen and with fisheries expanding, the costs of fisheries management and associated activities (enforcement, research and monitoring) are increasing. The Ministry of Fish Wealth receives an annual budget from the Government for its activities each year with this budget having increased over the past five years.

Revenues from fisheries licensing and royalties from the dwindling industrial fleet constitute the main source of fisheries-related income to the Government, although marketing taxes also contribute substantially to these revenues.

Although there is no formal link between the revenues received by the Government from fisheries royalties and licensing and the budget for the Ministry of Fisheries, in practice the Ministry's budget has increased more or less in line with the increased revenues.

In Yemen, two percent of the value of the catch is collected as a marketing tax by the Ministry of Fish Wealth and, with the increase in both volume and value of the catch in recent years, revenues from this source has increased substantially. However, with exports increasing (particularly to the European Community), the Ministry is being lobbied to drop this tax on exports so as to retain the competitiveness of Yemeni fish products in the European market.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Yemen ratified the UN Convention on the Law of the Sea (UNCLOS) in 1987 but has not yet ratified the UN Fish Stocks Agreement or the UN Compliance Agreement. However, Yemen is a signatory to CITES and broadly follows the FAO Code of Conduct for Responsible Fisheries in framing its national legislation.

The implementation of the provisions of International Plans of Action related to managing fishing capacity, IUU fishing, shark management and seabird by-catch in longline fisheries has not been pursued. As a result, no national plans of action for any of these issues are incorporated into national legislation.

PARTICIPATION IN REGIONAL FISHERY BODIES

Yemen is a signatory to the Regional Convention for the Conservation of the Red Sea and of the Gulf of Aden Environment (PERSGA) and participates in the activities of

¹⁶ However, there was extensive stakeholder participation in discussions on the new fisheries sector strategy which culminated in a workshop in 2001 involving the Ministry of Fish Wealth, donors, representatives of the artisanal fishing sector and the industrial sector. This dialogue is continuing and seemingly reflects a new approach by the Ministry of Fish Wealth.

this organization as funds permit. Yemen also has bilateral fisheries agreements with Iraq (1977) and Eritrea (1998) although the former agreement has been essentially non-operational since 1990.

National legislation does not require that regional fisheries issues are considered in making management decisions for highly migratory and straddling stocks.

SUMMARY AND CONCLUSIONS

The fisheries sector has traditionally been, and continues to be, an important part of the economy of Yemen, contributing around three percent of GDP and employing (directly and indirectly) over 500 000 people, mostly in rural areas where there are few other employment opportunities. The fisheries have been, and continue to be, based on significant stocks of pelagic and demersal species, including high-value species such as lobster, shrimp and cuttlefish, and, as a consequence, Yemen is one of the largest fish producers in the region.

Prior to 1990, the two separate entities of Yemen, (viz. The Peoples Democratic Republic of Yemen, or south Yemen and the Yemen Arab Republic in the north) pursued different fisheries development policies. The YAR had concentrated on supporting artisanal sector development while Government supporting infrastructure such as research facilities and monitoring, control and surveillance capabilities were not well developed. By contrast, the PDRY pursued a policy of supporting large-scale industrial fishing in the Gulf of Aden, with landings from this fleet including cuttlefish and demersal fish species. Artisanal fisheries development was of secondary importance although infrastructure facilities, such as cold storage facilities, fish markets, fish processing plants and boat and engine repair facilities were provided by, and run by, State-controlled corporations. The Government was also involved directly in the industrial catching sector through the Yemen Fisheries Corporation.

With the reunification of Yemen in 1990, these often-contradictory development policies needed to be integrated into a single, comprehensive and cohesive fisheries management and development by the Ministry of Fish Wealth. This task was made difficult, not only by the inheritance of the State-run production, marketing, processing and industry support Corporations (operating in southern Yemen) but also by the loss of expertise from the Ministry of Fish Wealth. However, with assistance from external donors, such as the World Bank, the European Commission and others, and bilateral assistance from a number of countries, Yemen has now developed a clear fisheries policy direction which is based on support of small-scale fisheries and limitation of the role of the industrial sector to offshore areas that are not exploited by small-scale fisheries. The three pillars of Yemen's fisheries policy has been summarized by the Minister of Fish Wealth¹⁷ as the following:

- Fisheries management based on strengthened fisheries statistics, regular fish stock assessment and an expansion of applied fisheries research,
- Gradual withdrawal of the state from its involvement in commercial activities and future focus on provision of an enabling environment through an improved regulatory framework, enforcement of rules and regulations by way of a more effective monitoring, control and surveillance as well as quality control,
- Improvement of coastal infrastructure including the provision of the fishing communities not only with access infrastructure and protected landing sites but also with basic services such as power, water, health and education.

Within this strategy, there is the recognition that supporting policy, information, research and physical infrastructure has been, and is presently, inadequate to provide the basis for sound fisheries management and development. Therefore, Yemen is currently

¹⁷ Ahmed Musaed Hussein in opening the conference on developing a fisheries sector strategic plan, in co-operation with the World Bank and European Commission, Sana'a 2002.

pursuing steps to provide these supporting services and, in particular, is in the process of upgrading its fisheries statistics system and its capabilities of fish stock assessment. In addition, the Government is also pursuing, within an overall Privatization Project, the privatization of functions that were previously undertaken by the various State-run Corporations, including fish production, marketing, distribution and processing.

While these reforms are being put in place, however, landings from all sectors of the industry are growing rapidly. This growth has been accelerated by sanitary certification by the European Commission of Yemeni fish and fish products, thereby allowing access of these fish and fish products to the large and lucrative European market. Reported landings¹⁸ rose by approximately 75 percent in the period 1994-2001, to around 142 000 t with landings further increasing to over 228 000 t in 2003, including over 60 000 t of exports. These increases are occurring at a time when there is considerable uncertainty regarding the status of some of the major fish stocks of Yemen, although there is general consensus that some of these stocks (in particular, the high value species of lobster, shrimp, some demersal species and possibly cuttlefish) are over-exploited.

Most importantly, much of the significant growth in Yemen's fish landings have come from small and large pelagic stocks which are most likely shared with neighboring countries in both the Red Sea and Gulf of Aden. To date, Yemen has only limited arrangements with some of these neighboring countries for joint or co-operative management of these transboundary stocks. Also, Yemen has not yet ratified the UN Fish Stocks Agreement which could provide the basis for management of these highly migratory and straddling stocks.

While Yemen has taken significant and important steps in addressing fisheries management policy issues, there remains much to be done. Stock assessments of the major commercial fish stocks need to be undertaken or upgraded to provide the basis for their management, monitoring, control and surveillance activities need to be upgraded to deter the presently common illegal fishing and management of transboundary stocks (particularly the important large and small pelagic species) needs to be increasingly seen within a regional context. If these reforms in fisheries management continue, the fisheries of Yemen can continue to be a major contributor to Yemen's economy and to regional fisheries production.

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¹⁸ Reported landings during the period 1990-2000 should be treated with caution, since during this period, the fisheries statistics collection system was not entirely effective and many landings figures are estimates.

APPENDIX TABLES

Current Management of Marine Capture Fisheries in Yemen

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs
National	20	nil	20	Unchanged
Regional		nil		
Local	20	nil	20	Unchanged

Use of Fishery Management Tools within the three largest fisheries in Yemen

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1. Demersal trawl	Yes	No	Yes	No	Yes	Yes ⁽¹⁾	No	Yes	No
	2. Cuttlefish	Yes	Yes	Yes	No	Yes	No	No	Yes	No
Artisanal	1. Demersal	No	No	No	Yes	Yes	No	Yes	Yes	No
	2. Pelagic	No	No	No	No	Yes	No	No	Yes	No
	3. Shrimp	No	Yes	Yes	No	Yes	No	No	Yes	No
Recreational	No significant recreational fisheries	No	No	No	No	No	No	No	No	No

(1) Catch restrictions relate to the prohibition on discarding 'trash' or unwanted fish.

Costs and Funding Sources of Fisheries Management within the three largest fisheries of Yemen

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries ⁽¹⁾	Resource rents
Industrial	1. Demersal trawl	Yes	Yes	Yes	No	Yes	No
Artisanal	2. Cuttlefish	Yes	Yes	Yes	No	Yes	No
Recreational	1. Demersal	Yes	Yes	Yes	No	Yes	No
	2. Pelagic	Yes	Yes	Yes	No	Yes	No
	3. Shrimp	Yes	Yes	Yes	No	Yes	No
	No significant recreational fisheries	No	Yes	Yes	No	Yes	No

(1) License fees, and other fisheries-related revenue, are paid to the Government Treasury. Management funding is then sourced from annual budget allocations to the Ministry of Fish Wealth. There is no specific link between the revenues collected and the budget allocation to the Ministry.

Compliance and Enforcement within the three largest fisheries in Yemen

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1. Demersal trawl	No	Yes	Yes	Yes	No	
	2. Cuttlefish	No	Yes	Yes	Yes	No	
Artisanal	1. Demersal	No	No	Yes	Yes	No	
	2. Pelagic	No	No	Yes	Yes	No	
	3. Shrimp	No	No	Yes	Yes	No	
Recreational	No significant recreational fisheries	No	No	No	No	No	

Capacity Management within the three largest fisheries in Yemen

Category of Fishery	Fishery	Does overfishing exist? ⁽¹⁾	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1. Demersal trawl	Yes	No	Constant	No	
	2. Cuttlefish	Yes	No	Decreasing	No	
Artisanal	1. Demersal	Yes	No	Decreasing	No	
	2. Pelagic	No	No	Constant	No	
	3. Shrimp	Yes	No	Decreasing	No	
Recreational	No significant recreational fisheries	No	No	No data	No	

(1) Because there are few, if any, stock assessments of major fish stocks, the responses are the author's opinions, based on published information and consensus of national and foreign scientists.

Country review: Kenya

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April 2005

INTRODUCTION

The Kenyan fisheries comprise freshwater (lakes, rivers and dams) and marine (Indian Ocean). Although prominently a subsistence fishery, the sector currently contributes about five percent to Kenya's gross domestic product (GDP). During the year 2004, the sector had an average producer value of slightly over US\$ 100 000 supporting the livelihood of about 500 000 people. There are about 50 000 people working in the sector directly, mainly as fishermen, processors and employees. Kenya's total annual fish production is estimated at 150 000 tonnes. Besides being a rich source of protein, fisheries are also important for the preservation of culture national heritage and recreational purposes.

The principal fishery is that of Lake Victoria, made up of Nile perch, Tilapia, and Fresh water sardine (*Rastrineobola argentea*). In 2004 the Lake Victoria accounted for 106 000 tonnes (71 percent of the total annual production). Lake Turkana is the country's largest inland freshwater body (7 400 square kilometers) compared to Kenya's 4 300 km² part of Lake Victoria) produces about 4 000 tonnes. Other freshwater bodies of commercial importance include lakes Naivasha, Baringo, and Jipe and the Tana River dams. The countries freshwater production comprises about 96 percent of the total annual production.

The country's marine capture fisheries potential is estimated at 150 000 metric tons, but the current production averages 7 000 tonnes which is about four percent of the total annual landings. This quantity is very low despite the fact that Kenya has a 640 km coastline with 200 nautical miles of the exclusive economic zone (EEZ). The country's coast is also located within the richest tuna belt in the Indian Ocean.

The main fishery products in the marine waters consist of demersals such as snappers, migratory pelagics such as tuna and tuna-like species, crustaceans such as shrimps and lobsters, and mollusks particularly octopus and squids. Limited artisanal activity and distant water fishing nations (DWFNs) fleet characterize marine fishery. This DWFN fleet comprises of purse seiners and longliners, fishing under access fee arrangements with the Government, with no obligations to land or trans-ship catches in the country. This arrangement limits the country's benefits from its EEZ fishery and denies Kenya development aspects associated with transshipment, landings for processing or even by-catch trade.

In the early 1990s sustainable fisheries management, development, conservation and utilization mandates in Kenya had been structured solely under government departments. Ten years later (2004) there has been a paradigm (policy) shift from government centered approach to stakeholders- (co-management) based approach. The new dimension has been taken to ensure that fishers and other fish users are involved in fisheries management and decision-making process in fisheries. In case of any fisheries depletion, the major stakeholders (fishers, traders, and consumers) will be the biggest losers in their socio-economic status while the government will lose in revenue and foreign exchange earnings. In this new approach, the good news can be that, management problems can be solved individually and co-operatively by resource

users, thus ensuring that resources are managed sustainably for realization of their full potential contribution to global food security and well-being of all mankind.

Despite these new policy changes, capacity, strategies, and tools of management have not substantially changed. However, stakeholder management groups, such as Beach Management Units (BMUs), in Kenya have strongly taken up the management of fisheries at beach levels.

The government in collaboration with stakeholders is currently involved in an exercise of carrying out an overall study of the fisheries legislations, institutional framework and policy guidelines in order to address to the new shift of fisheries management.

The strategic objective of the Kenya's marine fisheries management is to improve the current contribution of the fishing industry to a national long-term competitive and fast-growing industry, which is able to create job opportunities to both fishing communities and in industrial fish processing. Since this fishery is currently a relatively small sector within the national economy, its contribution will remain modest especially when measured in terms of long-term development in the exploitation of all the fisheries resources both in the waters of national territorial and EEZ. The waters of the EEZ for most times have been fished by vessels from DWFN and catches repatriated to the states where such vessels are registered. It is therefore necessary to limit and control the fishing pressure in accordance with what resources can sustain on long term basis. In spite of these constraints, the fisheries sector is of great importance to the country's economy in coastal region, supporting the livelihood of many coastal communities. The natural marine living resources of Kenya, as well as the marine environment in which they exist are a national asset and should be managed and developed for the benefit of present and future generations of the country.

The bulk of the marine production is consumed domestically, although the average *per capita* consumption of fish products in Kenya is relatively low averaging to 1.19 kg as compared with that of other fishing nations. The sector is also characterized by its substantial level of international trade, resulting to a significant net contribution to foreign exchange.

Marine fishing industry creates significant employment opportunities among the local communities. Although recent figures are not available, it is estimated that the total number of people employed in the commercial fisheries sector is around 27 000 distributed between sea and shore-based activities. In addition to these, it is estimated that another 60 000 people find employment in ancillary industries or sectors, such as market for supply of stores, equipment and services.

NB: No reliable information is available with regard to employment in the subsistence sector.

POLICY FRAMEWORK

Kenya fishery sector has been operating without any formal or conventional fisheries Policy except the Act of Parliament (The Fisheries Act) and its subsidiary legislation, which for all the time has served as both policy and legislative framework. This state of affairs has caused inconsistency in the fisheries management activities placing the fishing industry in uncertain course, and resulting into poorly attended national and international obligations and responsibilities on the management of marine fisheries. The embarrassing and glaring gap of this omission to the essential administrative and management instrument necessitated the Government of Kenya to initiate the process of policy development and drafting which was started in the year 2003 but progressing at a low speed because of inadequate financial resources. The ongoing exercise on national Fisheries Policy Framework development and drafting is the first comprehensive blueprint aimed at guiding sustainable fisheries management for posterity. The culmination of this exercise to develop set of principles to guide the

fisheries sub-sector's renewed efforts is being done in line with the new Government Policy for Economic Recovery Strategy and Creation of Employment (ERS) and Poverty Reduction Strategy (PRS). The Policy formulation process has been adopted and is collaborative in nature with involvement of broad fisheries stakeholders' approach. Through this policy, continuous advice and feedback mechanism will be encompassed and continuously sought. FAO has participated in this exercise on request by Kenya government to support in technical assistance. The first phase of making the initial draft has been completed. The phase has highlighted the critical areas to be covered and to be addressed during the second phase of the policy development.

What is in the Kenya's Draft Policy Framework?

The draft policy framework contains shared vision and clear directions on how Kenya's fisheries including marine capture fisheries are to be managed. Over time, as the role of resource users in the management of the fishery increases, the role of Fisheries Department will evolve from one taken up with day-to-day management of fishing fleets and fishing activities to one concerned primarily with developing policy and regulatory guidelines, setting direction and guidelines, and evaluating performance, while the resource users and other major stakeholders conduct the management roles. It is in this policy shift that BMUs, the lowest level of fisheries management institutional framework have been established in most fish landing sites to take the role of fisheries management within their areas. Legal framework to empower these units is at advanced stages of development and is likely to be ready by the end of 2005.

Conservation and Sustainable Use

Conservation of marine resources and habitat through rebuilding of resources and restoration of habitat where necessary will remain the highest priority for the management of the marine fisheries. Within the limits of available knowledge and necessary operating resources, the fisheries policy will have provisions requiring legislation be made to ensure all fishing activities are conducted in a manner that leads to sustainable resource development and utilization.

Implementation of these policy and legislative measures will result in a comprehensive management framework, which will clearly define the word "fisheries management" and will incorporate "precautionary approach" in decision-making especially in the absence of scientific information. The policy will also ensure application of ecosystem-based fisheries management where fishing activities will be conducted within an enforceable legislative framework, conservation ethics, and responsible fishing operations.

Self-reliance

Self-reliant in fisheries and continued collaboration with the Artisanal fishers' representatives; fisher community representatives; environmental groups; academics sector; industry and others; will contribute to the well-being of coastal communities. To be more self-reliant, resource users will ultimately have the flexibility to make decisions about their own economic and social objectives.

The framework will clarify the role of the government in supporting viable coastal communities and providing resource users with a greater role in shaping social and economic objectives. It promotes innovation, diversification, and the preservation of an independent inshore fleet and calls for self-adjustment mechanisms in all commercial fisheries.

Development of Stable and Transparent Access and Allocation Approach

The access and allocation of fisheries resources will be made in collaboration with stakeholders, decisions made and conflicts resolved through fair, transparent, and legally guided processes.

The aim of implementing the framework is to set a stable and transparent resource access and allocation approach including clarifying the process and criteria for determining “best use”, establishing decision-making guidelines for commercial access, allocation and stabilizing sharing arrangements in established commercial fisheries.

Shared Stewardship

Participants will be effectively involved in fisheries management decision-making processes at appropriate levels. They will contribute indigenous knowledge and experience, and share the accountability for outcomes. Scientific information will be applied whenever available, but its absence will call for application of “precautionary approach principle”.

The framework is expected to lead more inclusive approach to management planning, enable resource users to take role in operational decisions, facilitate participation in planning and decision-making including their support and capacity building to be able to take new responsibilities.

The policy framework is being created as part of a larger governmental mandate to lead in the sustainable management through co-management, which involves participation of key stakeholders. Current marine fisheries management practice is an integral component of a larger national Fisheries Management Plan (FMP).

Implementation of Policy Framework

As part of the policy development process, the government is already planning how some of the key strategies of the policy framework will be implemented. For instance, the government has shown commitment to implementation of the policy objective which requires all commercial fishing vessels to be fitted with vessel monitoring systems (VMS) and the government is in the process of procuring high-speed patrol boats for regular patrol and surveillance of both inshore and offshore marine fisheries.

Administrative and legal provisions for violations of the *Fisheries Act* and regulations made there under are being explored to ensure that non-compliance with fisheries rules and regulations is severely punished. Establishing co-management institutional and legal framework is an essential ingredient of sustainable fisheries management because it is transparent and involves the stakeholders in enforcement and management decision-making process and hence establishing clear fisheries management measures acceptable to the stakeholders. Successful implementation of policy and legal frameworks is based on the understanding that the resource users have been involved in the formulation of management decision-making processes.

LEGAL FRAMEWORK

The marine capture fisheries are managed under the provisions of *The Fisheries Act*. (Cap 378, *Revised Edition 1991*) and a number of subsidiary legislations made hereunder such as (Legal Notices No. 34, and 35 of 1991). Legal Notice 34 deals with national management of fisheries in a general nature. It covers all types of fisheries in the country i.e. both marine and freshwater capture fisheries. Legal Notice 35 provides legal framework for the management and control of foreign fishing vessels. Recently between the years 2000 and 2004, a number of other subsidiary legislative instruments imposing different management measures for both marine and freshwater fisheries have been formulated and gazetted as national fisheries legal instruments. The above legislative instruments are national wide in nature, but may be applied regionally and locally within the country. In these instruments, although their main purpose is fisheries management the word “management” is severally mentioned but its definition not given in the law.

Administratively, the Fisheries Act does not provide any structure at the regional and local levels; however, the Director is given legal mandates to administer the Act

from national level and may delegate the powers and functions regionally and locally to authorized officers.

The Fisheries Act identifies Fisheries Department as a single agency and authority that may in cooperation with other agencies manage the national fisheries. In the same way, Wildlife Management Act identifies the Director of Kenya Wildlife as the sole agency dealing with protected marine areas.

Fisheries Department under the Ministry of Livestock and Fisheries Development is the lead agency responsible for both fisheries management and development of all national fisheries including marine capture fisheries. The management of national, regional and local fisheries within the country is mandated to the respective fisheries offices throughout the country operating under delegated legal powers by the Director of Fisheries who is the administrator of the *Fisheries Act*.

Design of Marine Capture Fisheries Legislation

The legislation is itself designed into a framework that serves both as a tool or a plan for fisheries management. The legislative framework has set legal guidelines and steps to be followed during implementation of fisheries management, conservation, development, and utilization.

The law contains provisions which include management measures and regulations imposed for different fishing groups as well as individual fishers and touches on:

- Trawling of shallow water prawns
- Artisanal inshore fisheries
- Recreational fisheries
- Registration and licensing of all fishing vessels
- Fishing for aquaria fishes
- Catching and gathering oysters, and
- Control of foreign fishing vessels.

Content of Fisheries Management

Although fisheries legislation does not require that management decisions be based on biological, economic, and social considerations but in practice, these are taken into consideration when making management decisions. Also under monitoring, control, surveillance options, the biological factors including use of indigenous knowledge are taken into consideration. One unique thing with the national Fisheries legislation is that it does not list objectives for the management of fisheries, but opens with a statement as an Act of parliament for the development and management of fisheries.

Legislated Steps in Fisheries Management

Sections and regulations in the fisheries law spell out the management requirements and steps to be followed in management. They also define the authorized officers and states out their powers and steps to be taken for expeditious management of fisheries. The steps include and not limited to the following:

- Boarding and inspecting vessels of vehicles, impounding fishing gears or any articles used in the illegal fishing,
- Takes copies of documents and samples of fish or articles used in the commission of the offences,
- Handling and safe custody of articles or fish impounded,
- Compounding of offences whenever the culprits pleads to their guilty and they are willing that the cases be compounded, and
- Requirement for production of authorization documents and data on every fisher or the vessel.

The Fisheries Act (Cap. 378 (Revised Edition 1991))

The Fisheries legislation is applied in cross reference with other related laws and covers all the fisheries activities in the whole country in both freshwater and marine fisheries including the fisheries of the EEZ. The provisions of the law are in conformity with international laws, protocols, agreements, conventions and covers the following:-

- Registration, licensing and management of fishing vessels and operations in all national waters which include freshwaters, blackish and marine.
- Fishing craft in relation to navigation rules and regulations.
- Prohibiting illegal fishing gears and practices.
- Fish handling, processing, transportation, marketing, and distribution for commerce.
- Imposition of fisheries management and conservation measures such as closed seasons and areas.
- Provisions for the penalties for contravention of legal provisions and they may include fines, imprisonment, seizure, forfeitures of fish, craft, gears or any other articles used in the commission of offences.

This law provides rules and regulations for fish safety, marketing, handling, transportation, processing, storage, and distribution of fish and fish products. It also provides control measure or local and foreign fishing crafts, access (fishing) licenses both while in territorial and EEZ waters.

Environmental Protection Act

The Environment Conservation and Management law provides rules and regulations for protection, conservation, and improvement of environment. The law provides controls that prohibit for the prevention and control of pollution including conservation and protection of biodiversity critical natural habitats and general natural ecosystems, which also include marine and aquatic ecosystems. It also provides a provision for the integration of all other natural resources control agencies and makes rules for implementing the provisions of the international environmental agreements.

Legislation on Marine Protected Areas (MPAs)

The marine protected areas are managed under Wildlife Management Act (Cap.376) and is done according to specific regulations in localized areas. There are different pieces of legislations (Legal notices) establishing different marine parks and reserves. This legislation is administered and enforced by Kenya Wildlife Service (KWS) of the Government of Kenya. The management of these areas is done totally in isolation of fisheries legislation. Typically, establishment of MPAs is based on conservation, preservation, and protection of natural ecosystems and marine resources at selected areas. At the national level, MPAs include National Marine Reserves and National Marine Parks. There are six such marine reserves and five parks running along the Kenyan coastal inshore waters.

Legal and Political Constraints

Fisheries management rules, regulations and plans must comply with a wide range of state national rules and regulations. One of the greatest obstacles that the government must overcome with respect to fisheries as well as marine management and protection is the allocation of funds to such initiatives. Most projects, programmes, and plans are wholly government funded. However, in the recent years, there has been a paradigm shift in the country where arrangements are being put in place to reduce the state's cost in natural resource management and protection and in its place introduce plans to put more of the financial responsibility to the users. For instance, fishers and other resource users are being sensitized in fisheries management activities and requiring development of mechanism or institutional arrangement for the funding of fisheries

management, conservation and development operations. Fish levy trust fund that will be established under the new arrangements and sustained by funds accruing from fisheries resource rent. The new approach is planning to introduce the model of co-management and establishment of a fisheries management fund (Fish Levy) to finance fisheries MCS operations, research, and development.

Sport Fishing Regulations

Consistent with Fisheries Act (Cap 378) the fisheries management objectives are set to provide for meaningful opportunities for both commercial and recreational fisheries to be directed at improved incomes through responsible and transparent sharing of available fish stocks and ensuring that over fished stocks are protected and given time to recover. The management measures geared towards meeting these joint objectives are through government MCS activities and also equitable distribution of both the commercial and recreational fleets throughout the year. This is done in order to develop better understanding of interactions between the fishers of both fisheries in order to develop the process of identifying and working a mechanism for resolving any potential conflicts and minimizing imminent or subsequent conflicts in these fisheries.

The fisheries management actions are implemented in a manner that is consistent with conservation and management objectives. Fishery participants are required to comply with fishery monitoring, control and surveillance programs designed to address the issues relating to impacts likely to affect fish species and population. Recreational and commercial fisheries are structured to minimize the number of conflicts among different associated fisheries. Unanticipated management issues, including conflicts with fisheries directed at other species are resolved by involving the appropriate sport and commercial representatives in dispute resolution processes presided by government officials from Fisheries Department. Limits on incidental mortalities of non-target species is considered necessary for commercial fisheries management.

Management regimes will therefore include strategies to limit mortalities of turtles, seabirds, sharks and other non-target marine organisms in consistent with the FAO Code of Conduct for Responsible Fisheries and International Plans of Action on Illegal, Unreported and Unregulated (IPOA-IUU) Fishing, for Reducing Incidental Catch of Seabirds in Longline Fisheries, (IPOA-Seabirds), for the Management of Fishing Capacity (IPOA-Capacity), and for the Conservation and Management of Sharks (IPOA-Sharks).

In this direction of management legislative measures have been put in place requiring the prawn commercial fishers to fit Turtle Excluder Devices (TEDs) in their nets and Vessel Monitoring System (VMS).

STATUS OF THE FISHERIES

Kenya has a coastal line of about 640 km, extending from Somalia border in the north to Tanzania in the south. The territorial waters cover 12 nautical miles from the shore, while the exclusive economic zone (EEZ) covers 200 nautical miles. The living marine resources of Kenya have been exploited for many years and have been exploited as food source. However, artisanal marine data available on the catch of marine species reveal year in year out fluctuations. These fluctuations can be attributed to natural causes, notably environmental conditions that influence the abundance and distribution of different fish populations as well as human causes, which are known to exert excessive fishing pressure to fisheries resources. Despite considerable fluctuations in individual fish stocks, total marine catches remain steady at almost same figure for several years.

Not much information is available concerning the economic potential of the fish stocks of Kenya's EEZ including species composition, distribution and abundance, biology or their relationships with the environment.

The Kenyan fishery waters of 200 nautical miles (Exclusive Economic Zone) are believed to have vast fishery resources that are under-exploited by Kenyan nationals but are fished by DWFN fleets either on access licences or as IUU fishing vessels. The national fisheries management capacity has been weak and has not been able to ensure that there is proper monitoring, control and surveillance (MCS) and as a result there has been no data collection. However, if properly managed and utilized, they are capable of yielding very significant economic benefits to the country. An estimated potential of over 150 000 metric tons has been given but is subject to confirmation through a comprehensive stock assessment.

The fish species of EEZ are of principal concern and comprise highly migratory tuna and tuna-like species and sharks. The distant water fishing fleets targets these species. In addition, there are however other many species in this area comprising of deep slope demersal and midwater pelagic fish species that are of commercial importance. There are also other species in the area which include the Lutjanids (snappers, job fish and sea perch), Serranids (groupers), Carangiids (travallies), Lethrinids (emperors), Gempylids (snake mackerels), and many more.

There have been economic obstacles to realize the potential benefits offered by our marine resources within the EEZ because Kenyans have not yet engaged in rigorous investment in this area. To address to this problem the country is working on the fisheries policy and subsequent fisheries master plan, which will form the roadmap for the management, development and investment in the sector. The country is also working on a new policy which when approved will lead to establishment of Kenya Fisheries Development Authority. Some of the areas of approach to the development of the fishery is through development of shore infrastructure: especially fish ports and national fishing fleets, which may be owned by Kenyans, foreigners, or by joint ventures between Kenyans and foreigners. Therefore, there is great need for a comprehensive fisheries stock assessment of the EEZ in order to understand its full potential.

The territorial waters, which include creeks and reefs, contain large number of tropical fish and crustacean species which are traditionally fished by artisanal fishers as well as commercial prawn trawlers. The prawn trawling by catch comprises small pelagic, batfish and nearshore pelagic species such as wahoo, dolphin, rainbow runners, double lined mackerel, travelly, barracuda, Spanish mackerel. The bulk of these species compose trawling for prawn in shallow water, reef and creek fishes such as surgeonfish, rabbit fish, mullet, garfish, rainbow runner, and others. The estuarine species which include travelly, catfish, black bass and river herring and prawns, mangrove crabs, rock lobsters and many others. The reef fishery also support thriving aquaria fishery. The Kenyan fishery therefore is in three forms: i.e. capture fisheries that involve traditional or artisanal fishery, ring net fishery and sport fishing. The other activities are culture fisheries, which is quite minimal, and aquarium fishery. The latter contribute a great deal to the export of aquarium fish.

During the year 2003 the total production witnessed a slight increase and stood at 6 968 metric tons valued at Kenya shillings (Ksh) 487 million (approximately US\$ 6.4 million)¹ to the fishermen. This comprised of artisanal, commercial, and sport fishing. The commercial trawling mainly for prawns was done along the northern Kenya bank around the mouths of rivers Tana and Sabaki (Ungwana and Malindi bays) and was restricted to within six nautical miles off the shore coastline. Artisanal fishers used traditional fishing methods and manually propelled boats, hence being restricted to operate around the continental shelf inshore waters.

Demersal fishery accounted for 2 842 metric tons valued at Ksh 120 million (US\$ 157 925) to the fishers. Individual species which had high contribution in this fishery, included rabbit fish, Scavengers, Snappers, Parrotfish, and Pouter among

¹ Exchange rate = 76 Kenya shilling to one US\$.

others. Pelagic fishery accounted for 1 819 metric tons valued at Ksh 99 million (US\$ 1.3 million). The catches have been fluctuating over years due to migratory nature of species available for this fishery. The only species making up significant contribution are mackerels, Bonitos/Tunas, Cavilla jacks, Mulletts, Barracudas and Milkfish. Crustaceans' contribution was 756 metric tons with high value of Ksh 176 million (US\$ 2.3 million) with prawns taking the highest portion of 383 metric tons valued at Ksh 88 million (US\$ 1.2 million). Mollusks species had the least contribution of 393 metric tons valued at Ksh 25 million (US\$ 328 474) and, out of this, the Octopus contribution being the highest at 214 metric tons. In total, the fisheries contributed Ksh 975 million (approximately US\$ 6.4 million) to the fishers.

Aquaculture and mariculture potential is great; particularly prawn culture within the creeks. But lack of capital and technology to venture has led to stagnation of its development. Other factors include poor land tenure system.

FISHERIES MANAGEMENT ACTIVITIES

Monitoring, Control and Surveillance (MCS)

In an effort to curtail the effects of unauthorized fishing, illegal fishing gears and methods on the Kenya's marine fisheries resources, *the Fisheries Act (Cap.378)* empowers the Director of Fisheries to conduct Monitoring, Control and Surveillance (MCS) on all the fisheries and fishing activities in entire Kenyan waters.

The Kenyan marine capture fisheries management action plans in application include licensing of both local and foreign fishing vessels and giving them fishing access to the fisheries resources including the waters of her EEZ. Foreign fishing vessels are not allowed access to the territorial waters and they are limited to the part of the EEZ between 20 and 200 nautical miles. Important conditions are attached to the access permits requiring the captains of the vessels to fit the vessels with VMS and provide information on their fishing, the fish catch on board at intervals of one week, make it possible for government officers to be able to board their vessels. They are also required to report on any non-target fish species or other marine organisms, particularly marine mammals and turtles incidentally caught and returned to the water, and also the total bycatch landed or discarded at sea. These legal arrangements are made mandatory in order to ensure efficient prevention, deterring and combating IUU fishing in Kenyan waters.

The government of Kenya is strongly committed in acquiring and enhancing the management capability to conduct MCS of her territorial and EEZ waters through the installation of land based vessel monitoring system (VMS) and making it mandatory for every vessel fishing in the Kenya's water to be equipped with a transponder with a capacity to communicate with the land based VMS stations. Kenya law enforcement officials board and inspect all fishing vessels for violations of the conditions attached to the issuance of the fishing license. There are also management conditions requiring effective documentation of all catches by all vessels, restrictions of certain fishing in some areas in order to prevent destruction or degradation of the fragile marine ecosystem such as MPAs, coral gardens, spawning or nursery grounds of some species of marine organisms and compliance with regulations governing closed areas and seasons. In her mandate, the Department of Fisheries is responsible for preparing and amending fishery management plans for each fishery that requires conservation and management. To restore national marine fisheries, Kenya government established marine reserves, parks, and sanctuaries as a tool in fish restoration or management. Through this restoration program, inventory of critical fish habitats are made and protected to give refuge to threatened fish species enabling them to recover.

Importance of Inter-communities Co-management in Fisheries Management

Co-management concept involves sharing of rights and obligations to fisheries management among equal partners. The fishers co-manage fishery resources through a

system of rights and obligations established under Beach Management Units (BMUs) within the fishing communities.

Establishment of Fishers' Co-management

Formation of Fishers' co-management groups is the government's full recognition of the potential of fisheries users in the exercise of management and allocation of fishing rights among their different group of fishers. Local fishing communities base fishing rights on traditional control and governance. The fisheries stakeholders arrange to come to a common understanding of these rights, responsibilities and this becomes the driving force in the formation of management groups. The fishing rights of individual group cannot be established in isolation from those of the others within the fishing community. This new concept of approach is believed to be an effective option for sustainable fisheries management. The approach will re-establish respect for the fishers and effective control over the resource. To reciprocate the new dimension of fisheries management, the fishers must demonstrate that they can work together under co-management system.

Achievement of Co-management

The first step is to establish a system under which the fishers can work together to reach consensus and agreement on customary laws and the system of co-management. In this situation two approaches are in play, customary and internationally approaches are being used to develop consensus on these matters. For example, the system for making international agreements, conventions and protocols could be adopted to improve and establish customary law between the fishers through series of local agreements such as memorandums of understanding (MOUs).

The fishers are made to understand the need to develop a common understanding of the customary rights, which underlie fishing rights and the traditional system of co-management. To do so they must share information on traditional indigenous knowledge on fisheries, laws and rights.

The coastal fishing communities have seen the need to develop proposals for inter- communities co-management under this new concept. Inter-community co-management proposals address relationships between the fishers from different groups responsible for managing shared fisheries resources. Extensive inter-communities co-management arrangements are necessary for such stocks. The catching and management of such stocks must be integrated over its entire range. This would help to conserve the resources if all the groups are able to conduct their responsibilities and also enjoy their rights to access the stock.

Each co-management proposal may include agreements on the things necessary to be done to ensure fishers' fishing rights are recognized while ensuring conservation and stewardship of stocks are not compromised through promotion of:-

- Principles of sharing and co-management.
- Establishment of management beach committees including vigilante groups.
- Joint fisheries patrols, surveillance and development activities.
- Coordinated and agreed fishing gears, practices, seasons, landing sites as well as fishing grounds.
- Harmonized monitoring, control and surveillance.
- Commitments to joint participation in other aspects of fisheries management.
- Formation of dispute resolution mechanisms among different fishing groups and coastal communities.

Common policies are needed when dealing with other issues such as resource allocation, management of commercial and recreational fisheries, aquaculture development, stock enhancement, and habitat protection and biological considerations.

The fishers may also wish to develop common positions on the management roles between the fishers of different groups and government officials.

The fishers implement some aspects of inter-communities co-management without the agreement of the government although the government retains the power to regulate their activities and also give advice to the groups. Negotiations regarding implementation of co-management proposals are undertaken jointly by groups of communities or by coordinating the bilateral talks between communities and government. The need for an organization formed of all communities having a role of advancing principles and changes in management policies supported by all fishing communities is an effective tool in this kind of management.

Restoration and Management of Fisheries Stocks, Ecosystem and Critical Habitats

Through various laws, the Kenya government established marine reserves, parks, and breeding grounds. These management measures allow the development of fish stocks and provide refuge for recovery of threatened fish stocks. A number of government institutions are responsible for ensuring that the MPAs, fish stocks, ecosystems, and critical fish habitats are protected and non-compliance is handled through court processes.

Through these legal arrangements, inventories of critical fish habitats (such as coral gardens), wetlands of national importance (such as mangrove forests), and estuaries have been performed and have led to the protection of such areas.

COSTS AND REVENUE OF FISHERIES MANAGEMENT

Government financial transfers (GFTs) to the marine capture fishery sector represent a significant policy intervention. The expected effects brought about by GFTs depend on the type of transfer as well as on the management system in place. Government financial transfers in Kenya shows that at least US\$ 1.5 million (Ksh 116 million) was spent on general services between the 1997 and 2002, which was 5.6 percent of the US\$ 25.1 million (Ksh 2 billion) value of the 30 272 metric tons of fish landed during the same period. During this period the Government collected US\$ 156 806 (Ksh 13 million) as revenue, which was about 11.1 percent of Government Financial Transfer (Expenditure) as general services to the marine fishery sector. General services include fisheries research, management, and development especially improvement of infrastructure. Most of these services are important for ensuring the sustainable utilization of fish stocks and protection of aquatic ecosystem. Other forms of financial transfers spent in the support of fisheries are in the form of enhanced revenue and cost reducing transfers to the sector. Due to insufficient data, it is not possible to determine in detail the impact on fisheries management as relates to government financial transfers.

In Kenya, access charges are paid in form of licenses, certificates, permits, and royalty fees. This does not take into account the size of the catch that a fisher catches and lands, but on the size of the vessel, although licensing of foreign vessels are not based on any parameter. This nature in the current Kenyan charges on access to fishery reflects a situation of inequitable distribution of national resources. Smaller vessels are affected more than the larger vessels because they generally take less of the resource than larger vessels. To counter this effect, an annual access charges can be scaled according to some parameters related to the fixed costs of effort, such as the size of the vessel or its engine power (or indeed to the actual capital value of the vessel). This is where the management cost recovery levy is determined on a per unit basis such that the levy paid by the fisher is the product of the per-unit charge and the number of units attached to the boat. This also applies to the less skilled fishers or those using less efficient methods.

Implementation of Global Fisheries Mandates and Initiatives

Conservation and Management of all the national fisheries including EEZ is the mandate of the government and is executed by the Fisheries Department. This institution is responsible for controlling and authorizing all fishing vessels to fish in Kenya waters, but foreign vessels are prohibited from fishing in the inshore waters (0-20 nautical miles). The government formulates rules and regulations that govern development, management, and conservation of fisheries both in the inshore and within the exclusive economic zone. The institution has personnel who are technically knowledgeable in fisheries management and conservation issues of all the fisheries resources including handling of issues related to conflict resolution among different groups. The Department is also responsible for preparing and amending fishery management plans for each fishery that requires conservation and management. In terms of implementing FAO compliance agreement, Kenya government's institutional capacity has been inadequate and thus, not able to effectively monitor, control and conduct surveillance in her EEZ including the high seas adjacent to her EEZ.

Kenya has also complied with UN Fish Stocks Agreement by ratifying the agreement and acceding to it in 2004. At the same time, Kenya is in the advanced stages of paying for the membership of Indian Ocean Tuna Commission (IOTC).

Kenya, as a member of FAO, has a responsibility to implement the Code of Conduct for Responsible Fisheries. The agreement is being followed up but faces many challenges due to weak institutional capacity.

In an effort to implement the IPOA-IUU, IPOA-Capacity, IPOA-Seabirds, and IPOA-Sharks, Kenya has taken a major step in the year 2004 through enhancing of her national institutional capacity in fisheries monitoring, control and surveillance (MCS). The country realized the need for effective MCS and in the effort to enhance capacity; the country has managed to procure fisheries patrol boats, provision of modern equipment in information technology (ICT) and is in the process of setting a national Vessel Monitoring System (VMS).

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBS)

Kenya has not been a member of any regional fisheries body in the region. However in the understanding of the role the regional fisheries bodies take in fisheries management and taking into account that there are stocks of tuna and tuna-like fish species available in her EEZ, she decided to become a member of the IOTC, effective from July 2004. She has been an active member in the negotiations and processes of establishing South West Indian Ocean Fisheries Commission (SWIOFC), a body that will be responsible for the management of fisheries resources of the coastal states within the area of competence and also the South Indian Ocean Fisheries Agreement (SIOFA), responsible for the management of fisheries resources other than tuna and tuna-like fish species in the high seas adjacent to the EEZs of these coastal states.

The international community, by means of the post 1982 UN fishery instruments, has opted to give an increasingly important role to RFBs for the management and conservation of world capture fisheries. Despite frequently operating in adverse circumstances due to inadequate mandates or terms of reference, poor funding, fewer staff and lack of political commitment by members; RFBs play a primary role in the sustainable management and utilization of fisheries resources by means of facilitating regional cooperation. However, more substantial attention must be given to the implementation of the post 1982 UN fishery instruments, particularly those that are formulated under auspices of FAO and clearly envisage a more proactive role of RFBs in the conservation and management of international, regional, and national fisheries.

A review of information provided by RFBs shows that very few bodies are implementing the conservation and management measures in speed suitable to ensure achievement of global sustainable fisheries management. This conclusion is perhaps not

surprising because the instruments present complex scientific, managerial, and political considerations that cannot be resolved quickly. The result of this state of affairs is that, despite international expectations for RFBs to take effective measures assist in the effort to conserve and manage capture fisheries, there is little facility for this to occur unless their roles and functions are strengthened as presented in the fishery instruments. The deficiencies that are common to many regional fisheries management bodies must be addressed in a more comprehensive and rational manner if global sustainable fisheries management and utilization is to be realized.

SUMMARY AND CONCLUSIONS

The national fish production given in this report is mainly from reef and near shore fisheries. Data for deep water and off shore fisheries is not available because fishing is done by distant water fishing nations some of which operate under access licences while others are operating illegally hence can be said to be IUU fishing vessels. However because of inadequate capacity for Kenyan government fishing by these unauthorized fishing vessels have continued fishing in this manner with impunity.

Recently, the government has realized the importance of protecting her resources in her EEZ. To address this matter, a memorandum of understanding between fisheries enforcement division and the Navy has been signed allowing the two institutions to conduct marine surveillance exercises in a collaborative manner. In addition to the said MOU, the government has also enhanced the financial resources allocated to fisheries management in order to beef up marine surveillance and control. The country is now in advanced stages in the process of acquiring MCS vessels and installation of VMS. At least four (4) vessels for control of near shore (territorial) fisheries have been procured in the year 2004. This national initiative will ensure that all the vessels licensed as Kenyan Flag carriers and those issued with foreign licences have compatible VMS installed before they are allowed to do fishing. Navy patrol vessels have also been engaged in rigorous patrols in the entire EEZ, and every vessel entering the EEZ has to report her entry before to Fisheries authorities.

In pursuit to national initiatives in fighting illegal fishing, which is subjecting reef fisheries to excessive pressure, the country is exploring new avenues and means for addressing national and regional obligations. The country has also initiated work on the formation of committees to deal with IUU fishing at all levels i.e. nationally and regionally.

Kenya is strongly committed to enhancing the management capability regime of her both territorial and EEZ waters through the installation of vessel monitoring system (VMS) and making it mandatory for every vessel fishing in the Kenya's water to be equipped with a transponder with a capacity to communicate with the land based VMS stations. The country has a number of law enforcement officials who have power under the law to board and inspect all fishing vessels for violations of the conditions attached to the issuance of the fishing license as well as compliance with international laws. There are also requirements for effective documentation of all catches by all vessels, restrictions of fishing in some areas in order to prevent destruction or degradation of the fragile marine ecosystem such as MAPs, coral gardens, spawning or nursery grounds of some species of marine organisms and compliance with regulations governing closed areas and seasons. The Department of Fisheries is responsible for preparing and amending fishery management plans for each fishery that requires conservation and management.

In an effort to implement the IPOA-IUU, IPOA-Capacity, IPOA-Seabirds, and IPOA-Sharks, in 2004 Kenya has taken a major step through enhancing of national institutional capacity in fisheries monitoring, control, and surveillance (MCS). Kenya has also decided to become a member of Indian Ocean Tuna Commission (IOTC) effective from July 2004. She has been an active member in the negotiations and

processes of establishing South West Indian Ocean Fisheries Commission (SWIOFC), a body that will be responsible for the management of fisheries resources of the coastal states within the area of competence and also the South Indian Ocean Fisheries Agreement (SIOFA), responsible for the management of fisheries resources other than tuna and tuna-like fish species in the high seas adjacent to the EEZs of these coastal states.

On completion of the fisheries policy and masterplan, preparation of management plans for different marine fisheries will be undertaken.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries in Kenya

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	>60	<20	70	Unchanged
Regional	Coastal & Marine	>20		Unchanged
	East of Rift Valley	<80		Unchanged
	Rift Valley	>60		Decreasing
	Western	>80		Increasing
Local				

Summary information for three largest fisheries of Kenya (by volume) in 2003

Category of Fishery	Fishery	Volume tons	Value* million USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	Shallow water prawn	909	3.116	10.6	27.33	Yes	107	5
Artisanal	Mixed reef fishing	7 805	7.715	87.16	70.67	No	8 910	2 093
Recreational	Sport fishing/game fishing	234	0.218	2.61	2.00	No	n.a.	135

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

n.a. = not available.

Use of Fishery Management Tools within the three largest fisheries in Kenya

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Shallow water prawn fishery	Yes	Yes	Yes	No	Yes	No	No	No	No
Artisanal	Mixed Reef fishery	No	No	Yes	No	No	No	No	No	No
Recreational	Sport and game fishing	No	No	No	No	No	No	No	No	No

Costs and Funding Sources of Fisheries Management within the three largest fisheries of Kenya

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Shallow water prawn fishery	No	Yes	Yes	Yes	Yes	Yes
Artisanal	Mixed reef fisheries	No	Yes	Yes	Yes	Yes	Yes
Recreational	Sport and game fishing	No	Yes	Yes	Yes	Yes	Yes

Compliance and Enforcement within the three largest fisheries in Kenya

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Shallow water prawn fishery	Yes	Yes	Yes	No	No	
Artisanal	Mixed reef fisheries	No	Yes	Yes	Yes	Yes	
Recreational	Sport and game fishing	No	No	No	No	No	

Capacity Management within the three largest fisheries in Kenya

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Shallow water prawn fishery	Yes	Yes	Constant	Yes	Reduce pressure over the available biomass
Artisanal	Mixed reef fisheries	Yes	Yes	Decreasing	No	
Recreational	Sport and game fishing	No	Yes	n.a.	No	

n.a. = not available.

Country review: Madagascar*

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August 2004

INTRODUCTION

Situated to the East of Africa in the Indian Ocean, Madagascar is classified among the largest islands in the world with 5 600 km of coastline.

The western coastline benefits from a large continental plateau covering, up to the 200 m isobath, an area of 117 000 km². The Malagasy Exclusive Economic Zone covers an area of 1 140 000 km² which represents twice the surface of the island.

The maritime fisheries sector is structured in three main segments: traditional fisheries, artisanal fisheries and industrial fisheries. Traditional fishing is done on foot or in a dugout canoe while artisanal fishing is characterized by the use of motorized boats using engines not over 50 horsepower. The industrial fishing fleet is made up of boats powered by engines over 50 hp.

Traditional fishing has always been practised in Madagascar and industrial fishing developed from 1963, with the advent of shrimp fishing. Production has been on the increase ever since and the sector, traditionally important as a food supply for the population, has rapidly become of strategic importance to the country's economy.

Fifty-five thousand traditional fishermen produce 95 percent of fish for the local market and they contribute to a significant enrichment of the population's diet as they are the source of 3.9 kg/inhabitant/year out of the six kg/inhabitant/year available¹. These fishermen can use a variety of non motorised vessels, using sails or oars. Nonetheless, traditional fishing is mostly an activity practised on foot by fishermen having a very limited range of action. Fishing techniques are varied: with various nets, canoes, baited boxes, tuelles gathered by hand and harpooning with or without diving.

In parallel to this, sea fishing offers interesting opportunities for the production of lucrative export resources and the industrial and artisanal fleet's catch is destined for the export market. In 2001, the production of fish and aquaculture was the main source of foreign currency for the national economy, bringing in US\$160 million (3.5 percent of GDP).

Even though fishing has been regulated since the 1920's, management policies only appeared in 1973 with the issue of licenses for fishing vessels. Actors from the fish production sector have for a long time been aware of the importance of the rational management of natural resources and development plans are now well documented and are drafted after consultation with experts and sector representatives.

The new data collected to write this review is mainly taken from the Malagasy government websites, Malagasy or international organizations, of technical documents of the FAO, of the work of seminars or discussions with the main actors of Malagasy fishing management.

POLITICAL FRAMEWORK

Ordinance 93022 of 4 May 1993 concerning the regulation of fishing and aquaculture establishes the basics of the fishing management process in the second chapter entitled

¹ This availability has been established taking into account a population of 16 million inhabitants.

* Translated from the original French.

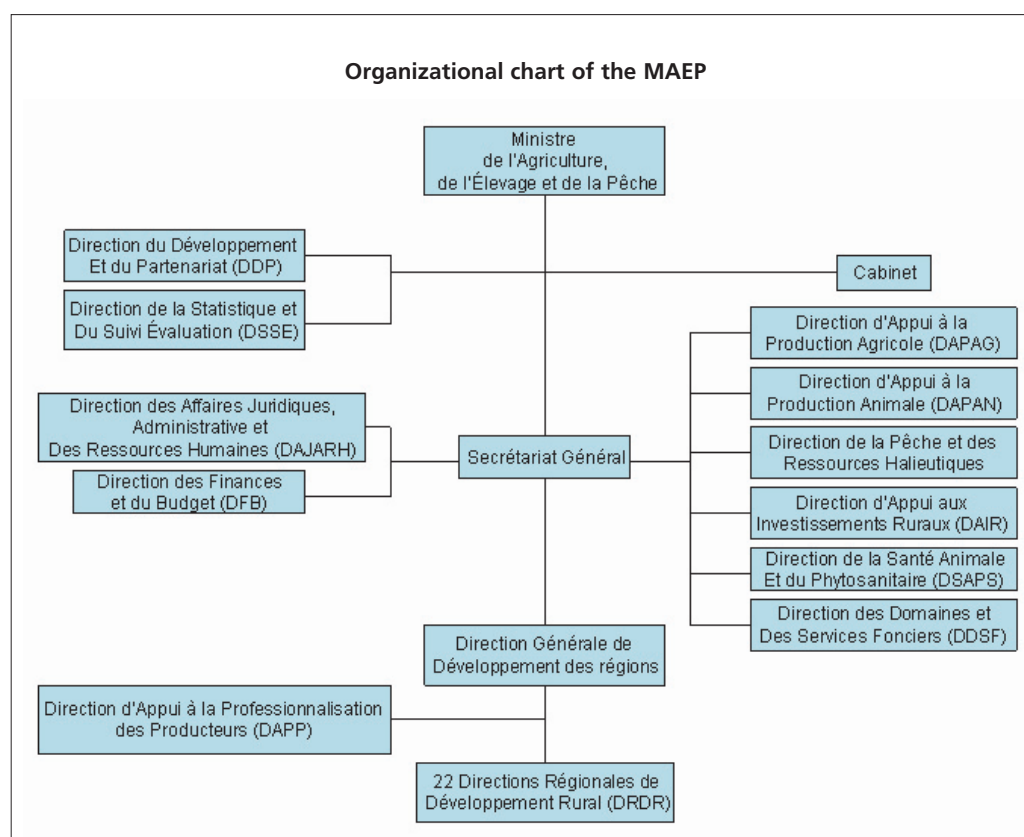
«fisheries management». It stipulates that the fisheries and aquaculture minister must prepare and keep up-to-date the fisheries management and fish stock conservation plans². In this manner, the aims of fishing management plans are defined in the fishing and aquaculture Directing Plan. They are concerned mainly with the rise of export revenue, the satisfaction of the population's food needs, the improvement of the fishermen's revenue, living conditions and job creation.

Moreover, the Malagasy constitution insists on the necessity of a rational exploitation of fish resources in order to preserve them for future generations. On the one hand, the Directing Plan must be fundamentally based on the development and application of good fish and aquaculture resource production management plans and on the other, the development of under-exploited and potential resources.

The Directing Plans are put into action through the drafting of Decrees fixing, for example, the number of licences issued or the level of taxation of a particular fishery.

LEGAL FRAMEWORK

The Ministry of Agriculture and Fisheries (MAEP) is responsible for the management of fishing through the intermediary of the Direction of Fishing and Fish resources (Grid Annex 12. in the Organizational chart of the MAEP). The enforcement and surveillance of the measures relative to the management of different fisheries are delegated to the Centre for Surveillance of Fisheries which stays under the authority of the MAEP.



² The Ministry of Agriculture and Fisheries defines the Directing Plans of Fisheries and Agriculture for a period of four years. These plans must integrate the programmes of the fish production sector at a regional level (Action Plan for Rural Development) and at community level (Community Plan for Development).

At the heart of the Regional Directions for Rural Development, the Regional Services for Fishing and Fish Production are in charge of the application and of consulting actors in each fishery at a regional level. They collaborate at a local level with the consultative councils for fishing and agriculture of each Faritany³. Its different agencies co-ordinate the application of fishing legislation and centralize the information concerning fisheries management, each at their own level of jurisdiction.

In the case of shrimp farming, the Groupement des Aquaculteurs et Pêcheurs de Crevettes de Madagascar (GAPCM) shares the responsibility for management of the fishery by a process of self management of its members. This professional group also has an important consultative role as it participated in the establishment of an Economic Observatory of the shrimp sector, an independent organization in charge of analyzing the performance of the industry with a view to establish recommendations for the drafting of management plans. The GAPCM has an enabling role in the dialogue and consultation between the authorities responsible for fisheries management and the industrial and artisanal fishermen, represented in the group (See Box 1). Traditional fishermen who are not adequately represented in the group are nonetheless invited to participate in fisheries management seminars organized jointly by the MAEP and the GAPCM with an active participation of the FAO.

The recommendations of the Economic Observatory are taken into account for the drafting of the Directing Plans by the MAEP. The performance indicators it evaluates are those concerning the revaluation of fish production, contributions to the State revenue, participation in the local supply of fish, collaboration with the traditional sector and contribution to the job market. The Economic Observatory is not the only organization to have a consultative role in the drafting of the Directing Plans. A Committee of wise men is constituted of three independent international experts and is financed by FED⁴. Its role is to analyze the shrimp sector in order to give recommendations to the Malagasy government, the GAPCM, the World Bank and the EU.

The management process is also influenced by the establishment of protected marine zones, in collaboration with the National Office for the Environment and different organizations acting in the environmental sphere, like the WCS⁵ and the WWF⁶. At a local level, these zones can have an important impact on traditional fisheries.

STATE OF THE FISHERIES

Fish production

The traditional fishing sector is responsible for the most important volume of catch with 53 percent of the total marine fish catch in 2002.

The other important volumes of catch are the product of the industrial shrimp and deep water fish industry (8.8 percent and four percent of the total volume disembarked in 2002). This industry is in a period of expansion as it was only authorized in 2001, and the catch was already of 4 157 tonnes in 2002. It contributes to the total increase of marine production between 2000 and 2002.

Tuna production is at 10 000 tonnes per year. Only foreign vessels, for the most part from the EU, participate in this activity and catch volume is defined in the framework of international agreements.

Industrial shrimp fishing production has stabilized around 8 500 tonnes a year for the last ten years, even if it was particularly high in 2002. Fish production issued from

³ Administratively, Madagascar is divided in six Faritany which can be assimilated to provinces: Antananarivo, Antsiranana, Fianarantsoa, Mahajanga, Toamasina, Toliara

⁴ European Development Fund : <http://europa.eu.int/scadplus/leg/fr/lvb/r12102.htm>

⁵ Wildlife Conservation Society (<http://wcs.org/>)

⁶ World Wildlife Fund (<http://www.wwf.org/>)

BOX 1

Use of professional groups in the participative management of Malagasy shrimp farming

Levels of production are stabilized at approximately 8 000 tonnes a year for industrial fishing in the last ten years, and at approximately 500 tonnes a year for artisanal fishing in the last five years.

This success is possible due to the fact that professionals of the industrial and artisanal sector have constituted a professional association in 1996 following the workshop on shrimp farming management in 1996, the Group for Aqua-cultivators and Shrimp Farmers of Madagascar. The objective of this group is the facilitation of dialogue and consultation between its members, to be a representative partner for the profession to the government and international organizations and to draft propositions concerning the establishment of a rational management policy for shrimp farming. The GAPCM has allowed the better co-ordination of management measures by involving the sector's professionals in the drafting process of management plans, which has made the process more transparent, therefore easing the fishermen's acceptance of measures taken.

Conscious of the importance of management based on scientific evaluations, the MPRH⁴ and the GAPCM, with the participation of the IRD⁵ and the AFD⁶, have put in place the National Programme for Shrimp Research in 1997. The PNRC is composed of three tiers: biology, socio-economics and anthropology. It has contributed to a better understanding of shrimp ecology (tagging campaigns) and has given information on the traditional fishing sector.

Collaboration between the MPRH and the GAPCM has enabled the establishment of the Economic Observatory in 2001, has founded the Economic Observatory in 2001, an independent organization in charge of the follow-up and the analysis of the sector's performance. It is the GAPCM that defined the organization, the mode of action and the performance analysis system of the Economic Observatory.

The most noteworthy management measure taken in the last few years has been the freeze in the capacity of the industrial and artisanal fleet in 1999: the number of licenses and the reference engine power have been limited to 1999 levels for two years. This measure followed an evaluation of shrimp stock levels and of the level of exploitation of the industry which was judged to be at its maximal level in 1998. This measure was reconvened in 2000 and is still applied in 2004. Taxes on its licences are determined for each season on the basis of an evaluation of available stock and an analysis of the fishery's performance.

industrial fishing are the bycatch of shrimp fishing and are destined entirely to the local market (3 175 tonnes in 2002) in order to contribute to the satisfaction of the local food needs of the population.

It is difficult to estimate the total value of fisheries' production, given the heterogeneous nature of the local market. Profit margins of industrial and artisanal fishing are nonetheless available and are valued at US\$59 million and US\$2.39 million respectively.

In employment terms, 96 000 people work in the fishing and aquaculture sector in 2001, of which 80 000 are traditional fishermen. The level of new jobs created during the last ten years is 28 000 (MEAP, 2004).

Exports in the fish production sector

Exports of fish and aquaculture production are an important source of foreign exchange for the State, with a value of US\$160 million in 2001. Marine production contributes to 77 percent of tonnage and to 74 percent of the value of these exports, shrimp fishing being the most important contributor with US\$76.26 million or 45 percent of the total value of fishing and aquaculture exports.

The total value of exports is increasing each year and has reached 1 090 billion FMG (US\$163 million) in 2002. It was of 402 billion FMG (US\$62 million) in 1996. This

Other management tools are presently being studied (Chaboud, 2003), notably a reduction in the time span of the fishing season, a reduction in the length of industrial fishing nets, reductions in the level of activity of the industrial fleet and an increase in the size of the grid cells of industrial fishing nets. Chaboud (2003) seems to believe that a reduction of 12 percent in the number of industrial fishing days would be very positive as it would have the following effects: +104 percent for Net Exploitation Revenue (NER), +26 percent for State revenue and +17 percent net foreign currency gains. Still following Chaboud's model, a reduction of the industrial fleet's activity level by a day a week would also increase the private sector's gains (NER) of 28.9 percent thanks to a better valuation of shrimp (+1.3 percent) as would an increase in the size of boat net grid cells (increases due to a better valuation of shrimp (+2.65 percent) are of 26.7 percent for the NER and of 14.4 percent for economic rent). Following this bio-economical simulation, the impact of these management measures would be an increase of 113 percent of NER after tax, of 26 percent of State revenue and of 20 percent of net foreign currency gains.

Moreover, industrial shrimp fishing boat owners are worried for the 2003 season. The strong world competition in aquaculture on small fish has pushed prices down in this segment (Andrianaijoana *et al.*, 2003)⁷. Actors of the industrial sector believe the non-respect of the fishing season by traditional fishermen has caused a reduction in the size of the catch and they fear negative net exploitation results for the 2003 season.

To counteract the increase in competition, the MAEP and the GAPCM want to focus on product quality and have therefore started a process of expert analysis to obtain the organic certification of Malagasy shrimp.

⁴ The MPRH or Ministry of Fish Resources has been integrated to MAEP in 2002 and can be considered as MAEP's Direction of Fisheries and Fish Resources.

⁵ Institute of Research for Development (www.ird.fr).

⁶ French Agency for Development (www.afd.fr).

⁷ On the European market, the price of Brazilian shrimp has become very competitive (less than six Euros a kilo to import). The average price of Malagasy shrimp for import (small and medium size) is still above ten Euros a kilo in 2002, the difference in price with the Brazilian shrimp can be explained by larger sizes and a better quality. At a global level, the Urner Barry (Index taking into account the price of all size shrimp) has gone from US\$7 to US\$3.5 for the White and has fallen by 20 to 30 percent for the Black Tiger.

increase is due to the development of shrimp farming since 1994, the production of which is entirely destined to the export market the development of aquaculture should continue in the future, projections for 2003 establishing an increase of production of 8 percent compared to 2002.

Consumption of fish products

Marine production is destined for the most part to the local market (64 percent in 2001). Data gathering in this informal sector is not dependable, given the great price variation between species, size, value added (smoking, salting, drying) and the geographical location of sale points. Nonetheless, it is certain that marine fish production, mostly traditional, is important to local market food supply, with a supply of 4 kg/year/inhabitant, total availability of fish and aquaculture produce being of 6 kg/year/inhabitant.

Evolution of fishing levels

Globally, indicators show an increase in fishing levels these last few years, even taking into account the lack of dependable data concerning traditional fishing (Tables 1-3).

Even with the freeze on the number and power of vessels since 2000, fishing levels are on the increase due to the rise in the efficiency of the boats. If one considers that

TABLE 1
Evolution of the production of fishing and aquaculture 1999 – 2002¹

Produce (tonnes)	1999	2000	2001	2002
Industrial Fishing²	22 474	22 571	24 663	26 638
Shrimp	7 888	8 303	7 889	9 207
Fish ³	2 586	4 268	4 517	3 175
Deep water Shrimp ⁴	0	0	130	99
Deep sea Fish ⁷	0	0	2 127	4 157
Tuna ⁵	12 000	10 000	10 000	10 000
Artisanal Fishing⁶	630	587	620	667
Shrimp	480	412	437	467
Fish ⁶	150	175	183	200
Traditional Fishing⁷	62 974	64 709	65 507	74 013
Shrimp	2 139	3 412	3 450	3 450
Crabs	868	1 030	1 347	1 428
Lobster	338	329	359	402
Trepangs	512	838	851	708
Fish ⁸	55 000	55 000	55 000	55 000
Other	4 117	4 100	4 500	13 000
Sub-total of maritime fishing catch	86 078	87 867	90 790	101 318
Algae (traditional production)	1 933	5 792	5 045	2 909
Sub-total of maritime fishing catch (inclusive of algae production)	88 011	93 659	95 835	104 227
Marine aquaculture (Shrimp farming)	3 486	4 800	5 399	5 566
Continental fishing	30 000	30 000	30 000	30 000
Fish farming	560	800	850	900
Rice and fish prod.	1 000	1 500	1 500	1 500
Total Production	123 057	130 759	133 584	142 193

¹ MAEP statistics (www.maep.gov.mg).

² Maritime industrial fishing is defined as being practised by vessels with engines over 50 hp. For shrimp fishing, maximum allowed power is 500 hp.

³ Estimates of the proportion of different species offloaded as by-takes of industrial and artisanal shrimp fishing (Faritany de Mahajanga):

- o Trident, Whiting (*Otholites argenteus*): 35-40%
- o Clupeids, carangid family: 40-45%
- o Sabre fish (hemiramphids family): 3-5%
- o Catfish, soles, ariids, bothids, haemulids Family: 15-20%

(Source: Andriamizara, 1998).

⁴ Deep water fishing concerns the waters in Malagasy jurisdiction at a depth of 200 m and over; the main species of deep water shrimp are: *Aristaeomorphes foliacea* and *Plesiopenaeus edwardsianus*, *Heterocarpus laevigatus*, *Aristeus varidens* and the main fish from these depths are: Orange Roughy (*Hoplostethus atlanticus*), l'Alphonsino (*Beryx splendens*), the Black Cardinal (*Epigonus telescopus*), the Black Ruff (*Schedophilus velaini*), the Barrel Fish (*Hyperoglyphe antarctica*), the Boarfish (*Pseudopentaceros richardsoni*) and the Ruby fish (*Plagiogeneion rubiginosus*).

⁵ Industrial tuna fishing in the Malagasy EEZ is practised exclusively by foreign trawlers.

⁶ Maritime artisanal fishing is characterized by the use of a vessel having an engine power not over 50 hp.

⁷ Traditional maritime fishing is practised on foot or in a canoe. The use of a single hull canoe equipped with an engine is classed in this category.

⁸ Carangidae, Mugilidae, Sparidae, Lutjanidae, Mullidae, Apogonidae, Rajidae family.

TABLE 2
Breakdown of exports in 2001

Exports of produce from fishing and maritime catch:			
	Quantity tonnes	Value (thousands of FMG)	Value (US\$)
Shrimp	9 874	502 686 868	76 262 894
Fish	6 332	58 787 477	8 918 680
Crabs	521	6 982 838	1 059 370
Other ¹	-	217 647 220	33 019 376
Total		786 104 403	119 260 321
Aquaculture produce exports:			
Shrimp	5 399	275 000 000	41 704 388

Source: MEAP, 2004.

¹ The value of tinned tuna export is the main component of the «other» category, with 166 576 823 FMG or US\$25 271 459.

Lobster fishing is also included in the «other» category. In 2001, lobster exports were of 256.7 tonnes for a value of 19 652 600 000 FMG (US\$2 981 506).

TABLE 3
Global evolution of certain indicators concerning trawler fishing (excluding deep water fishing)
from 1998 to 2002

		1998	1999	2000	2001	2002
Number of boats having returned invoices ¹	Industrial fishing	66 (74)	67 (70)	71 (72)	67 (71)	72 (72)
	Artisanal fishing	25 (36)	25 (36)	30 (36)	30 (36)	30 (36)
Number of fishing days		19 164	17 755	21 019	20 700	21 233
Fishing hours		310 285	298 880	326 322	327 374	325 289
No of trawler nets		125 671	128 756	151 618	144 934	152 099

Source: Andrianavojaona *et al.*, 2003.

¹ The number of ships in use is in between brackets.

the industrial and artisanal production has been stable from 1998 to 2001, the catch per unit of effort (CPUE) has diminished over the same period.

The state of fish stocks

Shrimp stock is the subject of particular attention on the part of MAEP and exploitation levels of this stock is considered to be at its maximum since 1998. The recent reduction of the average size of the catch in shrimp fishing indicates a slight over-exploitation.

Exploitation potential of other fish stocks have been evaluated (grid Annex 10) and these are for the most part under-exploited, apart from shark and trepang stocks, which are over-exploited and whose production has fallen in the last few years, going from 1 800 tonnes in 1997 to 708 tonnes in 2002 for trepangs. Shark production has fallen from 50 to 15 tonnes in the same period. If one considers that marine fishing production is based on ten fishing stocks (Fish⁷, shrimp, deep water fish, deep water shrimp, tuna, lobster, shark, trepangs, crabs and algae), two have been over-exploited (20 percent) and represent only 0.7 percent of total production tonnage of fishing in 2002, compared to two percent in 1997.

Red lobster stocks are considered to be badly exploited as the size of the catch is decreasing since 1995 with a stable production volume of 400 tonnes a year. For some writers (Andrianjohany and Randriamalaheo, 2003), this stock is thought to be over-exploited and when one considers this point of view, the percentage of over-exploited stock reaches 30 percent of the total.

Only shrimp and lobster stocks are used fully, representing 12.6 percent of the total tonnage of marine fishing in 2002.

Studies and deep water prospecting mention a potential 2 000 tonnes of shrimp, 325 tonnes of lobster and 7 000 tonnes of crab, the potential tonnage for fish remains unknown.

MANAGEMENT ACTIVITY

The Ministry for Agriculture and Fisheries (MAEP) is responsible for the management of different fisheries. It drafts a Directing Plan whose aim is to define the guidelines necessary to the development of the fishing and aquaculture sector over a period of four years. This plan is based fundamentally on the research for and the application of a good management of fish production and the development of the exploitation of little or not realized potential resources.

For the 2004-2007 period, the economical and social objectives of the plan are the following:

- increase in foreign currency state revenue;
- participation to the satisfaction of the population's food needs;
- improvement of the living condition and the revenue of traditional fishermen;
- job creation.

⁷ Carangidae, Mugilidae, Sparidae, Lutjanidae, Mullidae, Apogonidae, Rajidae family

BOX 2

Involvement of traditional fishermen in shrimp fishing management, a promising experience in Ambaro Bay

The participation of traditional fishermen is only possible when the latter are represented by associations or groups; the MAEP and the GAPCM encourage the creation of these associations because of the determining role played by traditional fishermen in the exploitation of shrimp resources (27.2 percent in volume of the total). Shrimp stocks being exploited to maximum levels at the moment, non respect of the fishing season by traditional fishermen causes the capture of an important number of reproductive and juvenile animals and one can notice a reduction in the size of shrimp taken during the season.

Local level initiatives are in development, in Ambaro bay for example where traditional fishermen have become conscious of their activity's impact and have regrouped in associations and co-operatives under the encouragement of the Nosy Be Fisheries (industrial fishing firm) and Kintana (collecting business). These associations and co-operatives meet every month and two exploitation initiatives have been taken:

- Traditional fishermen have agreed to respect the closing dates of 2002-2003 and the Nosy Be Fisheries have supplied the co-operatives with rice during that period. Repayment was delayed until the next fishing season.
- . The pôth¹ were forbidden and the size of the grid cells of the kaokobé was increased due to an important number of small animals being caught.

In a world context of strong competition for little fish coming from small calibre aquaculture, fishermen have difficulties selling their produce at a satisfying price. Revenue loss from a diminution of the catch of small calibre fish is therefore minimal for traditional fishermen.

Such measures are beneficial, limiting the take of small juveniles and revaluing resources by increasing the average size of the take of the fisheries over the fishing season.

¹ Engin de pêche traditionnel.

Nonetheless, the management plan has little impact on traditional fishing, except for some local initiatives involving shrimp fishermen (Box 2: Involvement of traditional fishermen in shrimp fishing management, a promising experience in Ambaro Bay), and management measures often only apply to artisanal and industrial fisheries.

Measures such as the obligation for industrial shrimp fishermen to disembark a minimum of 0.5 kg of fish for every one kg of shrimp can nonetheless contribute to the improvement of living conditions for traditional fishermen.

Even though all fishing is regulated in Madagascar, only shrimp, tuna⁸, lobster, crab, olothurians and algae fishing are covered by a specific plan. In this manner, in 2002, 30 percent⁹ of the maritime catch was managed following formal and documented plans.

This proportion has not increased in the last ten years, although the traditional sector is increasingly involved in management, be it through consultation or in an

⁸ The tuna fishing fleet is made up entirely of foreign vessels but the Malagasy State determines the total volume of the take stipulated in international agreements on the basis of the advice of the following regional organization: the Indian Ocean Tuna Commission (IOTC), Southwest Indian Ocean Fisheries Commission (SWIOFC), Western Indian Ocean Tuna Organization (WIOTO) and the Indian Ocean Commission (IOC).

⁹ This percentage of tonnage includes tuna, lobster, crab and algae fisheries, shrimp fisheries and its side take of fish. If the accessory take of shrimp fisheries is excluded, the percentage of managed fishing is 26.7 percent.

executive role. So as to improve this dialogue between traditional and industrial fishery actors, a feasibility study in 2000 and an execution study in 2003 were put in place in order to establish Concerted Management Zones.

The state of fish stocks is regularly evaluated by the DPRH. Shrimp stock exploitation is monitored by the shrimp Economic Observatory, co-financed by the AFD¹⁰, the GAPCM and the FDHA¹¹. This monitoring is specific, taking into account the socio-economic importance of this activity and the maximal level of present stock exploitation.

Stock evaluation influences decisions taken by MAEP in the fisheries management process, defined in order 93 022 but manager's recommendations are treated differently depending on the economic importance of the fishing concerned.

For stock whose exploitation is at a maximum (shrimp and lobster stocks) and which are important as the country's main foreign currency source, management measures are taken on a scientific basis. For example, from 1996 the results of stock evaluation (1996, 1998) have shown that the fishing effort was at its maximum (all sectors) for shrimp fishing. In 1998, during a workshop on shrimp fishing under the responsibility of the MPRH and organized in the framework of the Sectorial Fishing Programme of the FAO, the GAPCM proposed to freeze the fishing effort. The MPRH then limited the number of licenses to 1998 levels for duration of two years (order 4982/99). In 2000, this freeze was maintained at 36 licenses for artisanal fishing and 75 licenses for industrial fishing, based on 1999 references (Decree 2000-415). This measure was not accompanied by supplementary measures, such as restrictions in the volume of the catch and industrial companies compensated their diminishing returns by increasing the fishing effort to maintain production volume.

Over-exploited trepang and shark stocks, whose production in tonnage and export value are less important than shrimp have not been the focus of specific management measures to reduce or counteract this over-exploitation.

For under-exploited stock, the 2004-2007 Directing Plan for fishing and aquaculture foresees production increases of 1 000 tonnes a year for deep water fish and crab. For the latter, the MAEP estimates the exploitable potential to be 15 times the present production. Moreover, deep water crustacean and cephalopod fishing offer interesting development possibilities. The Directing plan put forward government initiatives to develop these fisheries but these are still awaiting financing.

Management provisions for traditional fishing

Traditional fisheries are not the object of important management measures. They are regulated like individual fishing, with a ban on the use of toxic substances, explosives and electrical devices to stun the fish as well as any equipment to prolong a dive longer than one using only breath. Moreover, in order to collect the produce of traditional fishing, collecting firms must seek the authorization of the Faritany Executive Committee President¹².

Lobster, crab, olothurian and algae fisheries are managed following different processes. An authorization from the Faritanu Executive President is necessary for the creation or the exploitation of a fishing enterprise, or the sale and collection of its product. The firm is obliged to technically assist fishermen in his action zone and help them purchase materials and fishing vessels¹³. He must also communicate on a monthly basis with the local fishing administration to provide fishing, collection and sale statistics.

¹⁰ Agence Française de Développement. (www.afd.fr)

¹¹ Fond de Développement Halieutique et Aquicole.

¹² Decree n°62.665 of 27 December 1962 which sets up the main measures regulating health and safety and the conditions in which maritime produce of animal origin destined to the market are preserved.

¹³ Decree of 5 March 1986 on the exploitation of lobster, crab, olothurians and algae.

Moreover olothurian and lobster fisheries are submitted to restrictions on the size of the catch (minimum of 11 cm fresh and 8 cm dry for olothurians and 20 cm for lobster¹⁴) but the restrictions concerning lobster are not enforced (Manolisoa and Sambo, 2003). Lobster fishing is also banned each year from the 1st of January to the 31st of March (Manolisoa and Sambo, 2003)¹⁵.

A workshop organized jointly with the FAO in 2003 had for aim the conception of a sustainable exploitation system of lobster fishing. Different dates for closing time and a reduction in the minimum size of the catch (a traditional fishermen's suggestion) were studied in the context of this workshop. Management of this type of fishing is a priority for MAEP and alternative management tools are being looked at, such as the development of mussel culture, the construction of collective holding pens, researching new equipment, new bait or the creation of a national database.

All these types of fishing are forbidden in natural parks, in this case the 117 km² of marine parks in Madagascar.

Management mechanisms for artisanal and industrial fishing

Shrimp production is by far the most important industrial and artisanal fishing production, in tonnage or value. It is the first source of revenue in foreign exchange for the fishing and aquaculture but also for the national economy with a total of 161 million dollars in 2001, maritime fishing contributing to 76 percent of this revenue.

Practised since 1967, industrial shrimp fishing has constantly been the object of studies by the Fisheries Ministry and international organizations (FAO, World Bank, AFD¹⁶, IRD¹⁷, and EU). Formal and documented management plans have been put in place in the last ten years. Management of the fisheries is well established and is based on a system of licences, fixed since 1999 and defined in zones, of tax on these licences and a period during which fishing is closed every year. The Grouping of Aqua-cultivators and Shrimp fishermen of Madagascar participates actively to the management of their industry.

In order to contribute to the local market, the MPRH has decided in 1998 to impose a catch for the local market of 0.5 kg of fish for each kg of shrimp retrieved¹⁸. This measure was taken due to the fact that a lot of fish was rejected by the industrial shrimp producers and that the industrial fish production was initially destined entirely to the export market. Even though there are no stipulations stopping the export of such fish, the latter are often small fish of little value not suitable for the export market.

Industrial shrimp fishing is associated with high levels of discard bycatch¹⁹ as non-target species use up space in the boats which could be used for high value shrimp (Andrianajivoaona *et al.*, 2003). Conservation of the bycatch calls for extra effort to be put in selection, transport, off-load and distribution. By taking up valuable space, bycatch also increases fuel costs. Nonetheless, the measures taken have been beneficial to the local population and have had relatively little impact on profitability in this sector, which remains the source of important value added in 2002.

Moreover, offloading fish allows for the compensation of small shrimp catches during the off season or in areas where the profitability margin is smaller. For

¹⁴ Decree n°62.665 of 27 December 1962 which sets up the main measures regulating health and safety and the conditions in which maritime produce of animal origin destined to the market are preserved.

¹⁵ Decree n° 200.139.

¹⁶ Agence Française de Développement (www.afd.fr).

¹⁷ Institut de Recherche pour le Développement (www.ird.fr).

¹⁸ Yearly decree 4926/2004 of the 3rd of March 2004 establishing the distribution of licences until the end of the 2004 season.

¹⁹ Industrial and artisanal shrimp catch contain from 34 percent to 63 percent of fish. Shrimp output varies from 6.5 to 13.1 kg/hour, fish output from 5.8 to 16.7 kg/hour.

example, on the East coast, the bycatch has allowed some firms to obtain positive net exploitation results.

Deep water fishing has only been authorized since 2001. Little information on this type of fishing is available, other than it is a sector in full expansion as off-loading represented 4 157 tonnes in 2002.

Deep water fishing is submitted to a regime of licences and tax. Fishing zones are regulated (two miles on the West coast and eight miles in the East), smallest grid cell size must be at least 45 mm wide and ship-owners have to provide the Fishing Ministry with statistics²⁰.

In addition, the surveillance system has been developed since 2002 thanks to a satellite system and a Fishing Surveillance Centre (CSP)²¹. All artisanal and industrial fishing vessels are fitted with the Inmarsat C global positioning system and must transmit their location to the CSP every hour (24 positions daily). CSP qualified observers, paid by the ship owners are working on each boat.

COSTS AND REVENUES OF FISHING MANAGEMENT

State revenue is taken from the following:

- Revenue from rents or management of material goods;
- Revenue from tax through the legislative process;
- Gifts and donations
- Gifts and subsidies to a fund;
- Revenue of financial compensation for the right of access to Malagasy waters;
- Revenue from the sale of confiscated produce or equipment;
- Tax on the distribution of licences;
- Revenue from fines and transactions.

For industrial shrimp fishing, social contributions and taxes on licences have increased in value by 85 percent, from 22.7 billion FMG (US\$3 391 603) in 1999 to 42 billion FMG (US\$7 115 026) in 2001, profits for the industrial fishing sector having progressed by 30 percent over the same period.

The artisanal shrimp fishing sector is in a more delicate economic situation and State revenue from that sector is limited to nine percent of total production.

Approximately 20 percent of this taxation is transferred to the Aquaculture and Fishing Resource Development Fund (FDHA) which was created to allow the DPRH to help and promote the aquaculture and fisheries sector. The main domains of intervention of the FDHA are:

- Fisheries management and stock conservation;
- Promotion of artisanal and traditional fishing;
- Development of aquaculture;
- The promotion of the local fish commercialization and establishment of the necessary infrastructure;
- Control and surveillance operations of the exploitation and commercialization of aquaculture and fishing resources;
- Research and development towards better identification and active exploitation in aquaculture and fishing;
- Any operation judged by the Ministry of Fisheries and Aquaculture to be compatible with and complementary to the good execution of the preceding activities.

Money from the fishing sector not transferred to the FDHA, that is 80 percent of it, is destined to the treasury. This money also has consequences for the fishing sector as MAEP's running costs are covered by the treasury.

²⁰ Decree n° 20510/2003 of the 01/12/2003 Establishing a «Standard Protocol» for fishing agreements.

²¹ Decree 1613/2002.

IMPLEMENTATION OF GLOBAL FISHING MANDATES AND INITIATIVES

Madagascar has adhered to international fishing management conventions, most notably the United Nations Convention on the Law of the Sea (UNCLOS), the Nairobi Convention on the Protection, Management and the Revaluing of the Marine Environment and the Coastal Regions of East Africa and has ratified the Agreement for the promotion of the respect of international management and conservation measures for fishing vessels on the high seas and the Code for Responsible Fishing (FAO 1995).

The United Nations Convention on the Law of the Sea for the implementation of the Dispositions of the Convention relative to the conservation and management of overlapping fish stock and migrating fish populations has not yet been ratified.

The Malagasy State has integrated some of the dispositions of these conventions to its legislation, like the setting up of a satellite surveillance system for boats in order to fight against illegal fishing or a capacity management programme for the artisanal and industrial shrimp fleet. Management policies which have for aim the rationalization of shrimp resources are in accord with the recommendations of the code for responsible fishing.

Moreover, the code for responsible fishing is to be developed to integrate the accidental capture of fishing birds in 2005.

A new decree (2003-1101) was published in November 2003. This modifies some dispositions regulating trawler fishing in Malagasy territorial waters and obliges fishing companies to install a Bycatch Reduction Device (BRD) as well as a Turtle Excluder Device (TED).

PARTICIPATION IN REGIONAL FISHERY BODIES

The Malagasy State is a member of and participates actively in the Indian Ocean Tuna Commission (IOTC), to the Southwest Indian Ocean Fisheries Commission (SWIOFC), to the Western Indian Ocean Tuna Organization (WIOTO) and in the Indian Ocean Commission (COI).

SUMMARY AND CONCLUSIONS

Madagascar is one of the world's largest islands, with over 5 000 km of coastline and 16 million inhabitants. It is situated in the most western part of the Indian Ocean and its Exclusive Economic Zone includes a vast continental plateau.

Fish resource production are one of the main sources of foreign exchange, amounting to US\$120 million (2.66 percent of GDP) and they contribute very significantly to the population's food supply.

Maritime fisheries are structured in three main segments:

- industrial fisheries, undertaken by boats with engine power over 50 hp;
- artisanal fisheries, undertaken by boats with engine power under or equal to 50 hp;
- traditional fisheries, done on foot or in canoes.

In terms of volume, the most important fishing is the product of the traditional sector, with a production of 55 000 tonnes a year, or 53 percent of the total Malagasy marine catch. Destined to the local market, the produce of this activity constitutes the main part of the 3.9 kg/an/inhabitant of fishing produce available to the population from maritime fishing.

Maritime shrimp fishing is the second largest in terms of weight, but constitutes the most important source of foreign exchange for this sector, amounting to US\$76.26 million in 2001. 70 percent of production is from industrial fishing and 26 percent from traditional fishing.

Foreign vessels account for an annual production of 10 000 tonnes of tuna, fished in the Malagasy EEZ in the framework of international agreements, mostly with the EU.

These three fisheries have had a relatively stable production capacity for the last ten years, but the present exploitation level for shrimp fishing does not seem durable in view of the fact that CPUE has diminished. Moreover, overexploitation of trepang and shark stocks has wiped out these resources and the present level of lobster stocks is not sustainable.

The growing importance of the contribution of the fishing sector to the Malagasy economy has led the government to look at fishing management for a number of years now. Sector actors have collaborated actively with international and regional organizations in order to manage fishing resources sustainably.

Stabilization of shrimp production volume, the setting up of an effective surveillance system, the inclusion of traditional fishermen in the consulting process and the conception of a sustainable management model for lobster fishing bode well for the rational management of Malagasy fisheries.

Even though traditional fisheries are difficult to manage, taking into account access to fishing villages and the fact that the latter still operate informally, the shrimp sector is the object of formal and documented plans. The recent evolution of management measures tends to improve the involvement of the traditional sector in management plans, encouraging them to avoid taking juvenile and reproductive fish during the off-season. These measures are based on a more active consultation of this segment in the management process, mainly by the establishment of Concerted Management Zones. As for shrimp fishing, an initiative to collect information concerning traditional fishing would allow for a better understanding of this sector.

Where industrial fishing is concerned, the fishing effort of the fleet has not ceased to increase, even in the face of a freeze in the number of licences issued and in the power of the fleet to 1998 levels. Complementary management tools should be put in place to diminish the pressure on stocks, such as the shortening of the season, or a reduction of the level of activity. These measures seem efficient due to the fact that world market prices for large calibre shrimp have been less affected by an increase in international supply than prices for small calibre shrimp.

As for lobster fishing, numerous recommendations have been made during the TCP/MAG/170 workshop «Conception of a sustainable exploitation system for lobster fisheries» and the Malagasy government must now decide which tools to adopt. Suggestions bear notably on a change of date for the season, the construction of collective holding pens, development of mussel cultivation, creation of a national data base or the training of fishermen and salesmen in post capture health and safety.

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APPENDIX TABLES

Current management of marine capture fisheries in Madagascar

Management level	% of managed fishing	% with fishing management plan	% with published rules	Trend in the number of managed fisheries (increasing/decreasing/no change)
National	100	30	100	increasing
Regional	100	30	100	increasing
Local	100	30	100	increasing

Summary of information for three largest fisheries (by volume) in Madagascar (2002)

Fishing category	Fishery	Volume thousand tonnes	Value* thousand US\$ (2001)	% of total catch volume **	% of total catch value **	Covered by a management plan ? (yes/no)	# of Participants	# of marine boats
Industrial	1 Shrimp	9 207	28 595 452	34.5 %	n.a.	yes	4 463	70
	2 High value deep water fish	4 157	n.a.	15.6 %	n.a.	no	n.a.	n.a.
	3 Shrimp fishing bycatch	3 175	493 410 ¹	11.9 %	n.a.	yes ²	4 463	70
Artisanal ³	1 Traditional fishing	55 000	n.a.	71.8 %	n.a.	no	55 000 ⁴	n.a. ⁵
	2 Traditional shrimp fishing	3 450	n.a.	4.5 %	n.a.	yes	55 000	8 000 ⁶
	3 Traditional crab fishing	1 428	n.a.	1.8 %	n.a.	yes	1 000	n.a.
Recreational	1 n.a.							

* Value in 2002 US\$

** % values are based on the total for each fishing category.

n.a. = not available

¹ Estimate on the 2001 catch, on the exploitation results of the main industrial fishing companies in 1997 and price indexes between 1997 and 2001.² In the framework of shrimp fishing management plans, some management measures are specific to the bycatch.³ The algae production (2 909 tonnes) has not been taken into account in this chart.⁴ This data is an approximation, estimates vary between 55 000 and 60 000 participants.⁵ No effective canoe census, but a study made in 1989 which estimates canoe numbers at 22 000.⁶ Estimates of the report of the Wise Men Committee for the GAPCM, the World Bank and the EU, 2003.

Use of fishery management tools within the three largest (by volume) fisheries of Madagascar (2002)

Fishing category	Fishery	Restrictions				Licence/limited entry	Catch restrictions	Restrictions based on rights	Tax	Performance standards
		Spatial	Time	Adopted	Size					
Industrial	1	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
	2	Yes	No	Yes	No	Yes	No	Yes	Yes	No
	3	Yes	Yes	Yes	No	Yes	No	Yes ¹	Yes	No
Artisanal	1	Yes	No	Yes	No	No	No	No	No	No
	2	Yes	Yes	Yes	No	No ²	No	No	No	No
	3	Yes	No	Yes	No	No	No	No	No	No
Recreational	1	Yes	No	No	No	No	No	No	No	No
	2	Yes	No	No	No	No	No	No	No	No
	3	Yes	No	No	No	No	No	No	No	No

¹ Rights linked to shrimp exploitation.² Exploitation subject to the Faritany president's authorization.

Costs and funding sources of fisheries management within the three largest fisheries

Fishing category	Fishery	Do the funds cover			Management funding source		
		R&D	Surveillance & Application	Daily management	Fishing licence rights	Licence rights of other fisheries	Resource rent
Industrial	1	Yes ¹	Yes ²	No ³	Yes	No	No
	2	Yes	Yes	No	Yes	Yes	No
	3	Yes	Yes	No	Yes	No	No
Artisanal	1	Yes	No	No	No	Yes	No
	2	Yes	No	No	No	Yes	No
	3	Yes	No	No	No	Yes	No
Recreational	1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

n.a. not available.

¹ Participation of international organizations (EU, AFD, World Bank, FAO).² The fisheries surveillance centre is financed in part by the EU.³ Observers on board are paid by the owner.

Compliance and enforcement within the three largest fisheries

Fishing category	Fishery	VMS	Observers on board	Random zone inspection	Routine inspection on land	Inspections at sea	Other (please specify)
Industrial	1	Yes	Yes	Yes	Yes	Yes	
	2	Yes	Yes	Yes	Yes	Yes	
	3	Yes	Yes	Yes	Yes	Yes	
Artisanal	1	No	No	No	No	No	
	2	No	No	Yes	No	No	
	3	No	No	No	No	No	
Recreational	1	n.a.	n.a.	n.a.	n.a.	n.a.	
	2	n.a.	n.a.	n.a.	n.a.	n.a.	
	3	n.a.	n.a.	n.a.	n.a.	n.a.	

n.a. not available

Capacity management within the three largest fisheries of Madagascar

Fishing category	Fishery	Overfishing?	Measure of the fleet's capacity?	FPUE increasing, constant or decreasing	Have capacity reduction programmes been used?	If they have, please specify the capacity reduction programme's objectives
Industrial	1	No	Yes	constant ¹	No ²	Overfishing prevention
	2	No	n.a.	n.a.	No	
	3	No	Yes	n.a. ³	No	
Artisanal	1	No	No	n.a.	No	
	2	No	No	constant	No	
	3	No	No	constant	No	
Recreational	1	n.a.	n.a.	n.a.	n.a.	
	2	n.a.	n.a.	n.a.	n.a.	
	3	n.a.	n.a.	n.a.	n.a.	

n.a. not available

¹ A study of biological and economic data show that Malagasy shrimp fishing is at its maximum level of exploitation, or probably just below it (Source: Rapport du Comité des Sages à l'attention du GAPCM, du Gouvernement de Madagascar, de la Banque Mondiale et de l'UE; 2003, p.13).² There is no capacity reduction programme but the licence level is frozen to 1999 levels in order to avoid over capacity.³ The ratio of catch per unit of effort is difficult to determine as offloading depends on the rejection level of the bycatch in shrimp fishing.

Fishing Potential of Malagasy waters

Resources	Potential (tonnes)	Exploitation level	Observations
I. Marine and estuary resources	326 100		
- Shrimp of the continental plateau (industrial fisheries)	8 000	Optimal	Catch in 1987 over 9 000 tonnes
- Shrimp of the continental plateau (traditional fisheries)	3 400	Maximal	Estimates of the catch in 1999
- Deep water shrimp	1 000	Under-exploited	Unknown potential
- Crabs (<i>Scylla serrata</i>)	7 500	Under-exploited	Estimates based on a productivity of 25 kg/inha/an for 300 000 ha of mangroves
- Red lobster of the continental plateau	340	Badly exploited	Catch in 1988
- Green lobster of the continental plateau	1 000	Under-exploited	Unknown potential
- Small pelagic fish	160 000	Not exploited	Acoustic evaluation, large part of non commercial species and/or fish of very small size
- Demersal fish	45 000	Under-exploited	Acoustic evaluation and trial fishing, soft bottom fish only, less than 50 percent of commercial value
- Tuna	51 600	Under-exploited	Estimate based on existing catch and on stock localized in the Madagascar-Comores-Seychelles triangle
- Reed algae	3 600	Under-exploited	Collect in 1973
- Trepangs	670	Over-exploited	Collect in 1990
- Fish from estuary waters	40 000	Under-exploited	Estimates on the basis of the area of lagoons and mangroves situated on the coast.
- Cephalopods	?	Under-exploited	Realized Abundance index (traditional fishing) near Ste Marie and in the South West
II. Resources in continental waters	40 000	Near maximum	Estimates on the basis of the area of fresh waters favourable to fishing (150 000 ha)
III. Aquaculture	105 000		
- Fish farming	30 000	Under-exploited	Estimates on the basis of the area of irrigated rice cultivation which can accommodate fish farming and rice (150 000 ha)
- Mariculture	75 000	Under-exploited	Estimates on the basis of the existence, west of Madagascar of approx 50 000 ha of favourable sites of which 15 000 ha of basin
IV. Total	471 100		

Source : MAEP, 2004

Country review: Maldives

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Marine Research Centre, Maldives

November 2004

INTRODUCTION

Maldives is an archipelago of nearly 1 200 coral islands grouped into 19 widely dispersed atolls covering an area of nearly 90 000 km² in the centre of the Indian Ocean. The country's Exclusive Economic Zone (EEZ) covers an area of nearly one million km². Marine resources are the country's main natural endowments, with economic activities concentrated on tuna fishing and tourism. Currently, marine capture fisheries account for 9.0 percent of GDP, 17.0 percent¹ of employment and 66.3 percent (by value) of the country's export commodities.

Tuna fishing is a well-established activity in the Maldives, with a history spanning over 750 years. The mechanization of the fishing fleet in the 1970s led to a rapid increase over historic tuna catches: from about 30 000 tonnes in the 1980s to over 90 000 tonnes in 1997; increasing to a record catch of 138 751 tonnes in 2003 (MoFAMR, 2003). Tuna fishing represents about 90 percent² of the total fish for food catches in the Maldives as reported in the national statistics (Table 1).

TABLE 1
Recent fish landings in Maldivian waters (tonnes)

Species	Scientific Name	2003 catch	Percent of total catches
Skipjack tuna	<i>Katsuwonus pelamis</i>	108 329	70
Yellowfin tuna	<i>Thunnus albacares</i>	21 767	14
Frigate tuna	<i>Auxis thazard</i>	4 356	3
Kawakawa	<i>Euthynnus affinis</i>	2 406	2
Dogtooth tuna	<i>Gymnosarda unicolor</i>	746	0
Bigeye tuna*	<i>Thunnus obesus</i>	1 147	1
Subtotal tuna		138 751	89
Other fish†	Reef fish varieties	16 664	11
TOTAL		155 415	100

Notes: *Estimated catch; †Excludes bait fish catch.

Source: Ministry of Fisheries, Agriculture, and Marine Resources.

The Maldivian tuna fishery is concentrated in the nearshore waters; so, a large area of the Maldivian EEZ is relatively unfished. However, a small fleet of longline, essentially foreign vessels, operates in the EEZ, targeting adult bigeye and yellowfin tunas. Recorded catch of this longline fleet is currently about 5 000 tonnes per year, believed to be grossly underreported. A small-scale handline fleet operates in nearshore waters targeting surface swimming large yellowfin (> 80 cm FL). Their catch of about 3 000 – 4 000 tonnes per year is exported either as a fresh product to a lucrative Japanese sashimi market or packed as loins for export to Europe.

The reef fishery resources were hardly exploited in the past (Adam *et al.*, 1997). However, with the rapid socio-economic development following the expansion of tourism and together with improved air and sea-transport, a number of reef fisheries³

¹ Number of fishermen reported in fisheries statistics as a percentage of economically active population.

² This excludes the bait fish catch which is now estimated at 15 000 t per year (MRC, unpublished data).

³ In Maldives the term **reef fishery** is referred to all fisheries except the tuna fishery. Reported as one category in the national statistics, reef fisheries component includes reef and oceanic sharks, jacks, scads, breams, jobfish, etc and varieties such as sail fish, seer-fish, rainbow runners, dolphin fish (mahi mahi).

have developed for both for local consumption and for export markets. These include the aquarium fishery, *beche-de-mer* (sea-cucumber), grouper fisheries.

For the purpose of this review, marine fishing activities have been grouped into two subcategories: 1) industrial tuna⁴, bait, and shark fisheries; and 2) small-scale fisheries⁵ comprising handline tuna and reef fisheries.

Information in this review was obtained from a variety of sources, including interviews with senior staff of Maldives' Ministry of Fisheries, Agriculture and Marine Resources, the Basic Fisheries Statistics⁶, Statistical Year Books and other recent documentation.

POLICY FRAMEWORK

The mechanization of the fishing fleet in the mid 1970s was a conscious and concerted effort by the Government. In the early 1980s, the policy on fishery development and management was guided by the need to serve the social objectives as the fisheries sector employed the highest proportion of the labor force (over 50 percent at national level and particularly more in the outer islands) and provided food security. Therefore, the Government deemed it important to protect the livelihood of fishermen and to ensure the Maldivians remain active in the tuna fishery industry. Thus, until recently, the sector was protected from large-scale competition and was heavily subsidized by the Government.

The policy objectives are set forth in the National Development Plan (NDP); which is reviewed every four to five years. The most recent NDP covers the 2001–2005 period and also mirrors the long term goals as set out in the Vision 2020⁷. The overarching objective of the current policy is to liberalize the tuna industry through greater private sector involvement and to stimulate economic diversification of fishery and, thereby increasing the value-added export products. As for the reef fisheries resources the objective is minimize the dependency on wild caught species by promoting mariculture of those species that are being exported.

The Maldivian fisheries are dominated by relatively low-value pole-and-line skipjack fishing; while fisheries targeting high-value tuna species (such as large yellowfin and bigeye tuna) remain at low landings levels. Similarly, a large proportion of the tuna exports are frozen, canned or as “Maldives fish,”⁸ low-value products. Thus, as mentioned above, diversifying the tuna fishery towards high-value, non-traditional species is a priority of the Government and attaining this evolution through greater private sector participation is highlighted in the current NDP.

While achieving the medium to long term objective of liberalizing the tuna industry and promoting mariculture of export varieties of reef fish, the management goal is to achieve sustainable utilization of the fisheries resources. Strengthening of monitoring activities, increasing research, devolution of management to the island communities and participating in regional fishery bodies are all important strategies set forth in the NDP to achieve the overall fishery management objective.

⁴ Industrial here is taken to mean the pole-and-line and the longline fisheries which takes more than 80% of the national recorded fish catch which is mainly exported in fresh, canned form.

⁵ Small-scale fisheries here are taken to mean the large yellowfin handline fishery and the multi-species reef fishery. The bulk of the large yellowfin is exported fresh (loins, dressed whole) while the reef fish are consumed locally.

⁶ Annual publication of the Statistics and Economic Research Unit, Ministry of Fisheries, Agriculture and Marine Resources

⁷ Vision 2020, Address to the Nation by His Excellency President Maumoon Abdul Gayoom on the occasion of the 34th Anniversary of independence of the Republic of Maldives, 26 July 1999. The President's Office, Malé 10pp.

⁸ “Maldivian fish” is a tuna product similar to the Japanese katusobushi. The gutted and gilled fillets of fish are boiled, smoked and sun-dried to make the Maldives Fish, exported to Sri Lanka and other neighbouring countries.

LEGAL FRAMEWORK

Development and management of capture fisheries in the Maldives is governed by the Fisheries Law of the Maldives (Law No. 5/87, August 24, 1987). The Law contains provisions on use and exploitation of the living marine resources, particularly fishery resources and on foreign licensed fisheries conducted in the EEZ of the Maldives.

The Ministry of Fisheries, Agriculture, and Marine Resources (MoFAMR) is charged with implementation of this Law and has the legal authority to make rules and regulations relevant to its implementation⁹. The responsibility for the enforcement of laws in the Maldives lies with the Ministry of Defense and National Security.

For the purposes of fisheries management, the Fisheries Law defines the EEZ as the area bounded between 75 – 200 nautical miles. Commercial fishing in the EEZ, both local and foreign parties, requires an annual fishing license provided by the Ministry of Trade and Industries following guidelines provided by the MoFAMR. The area bounded within the 75 mile limit is called a Coastal Fishery Zone which is exclusively reserved for Maldivian fishermen (Figure 1). The fisheries in the Coastal Fisheries Zone do not require licensing.

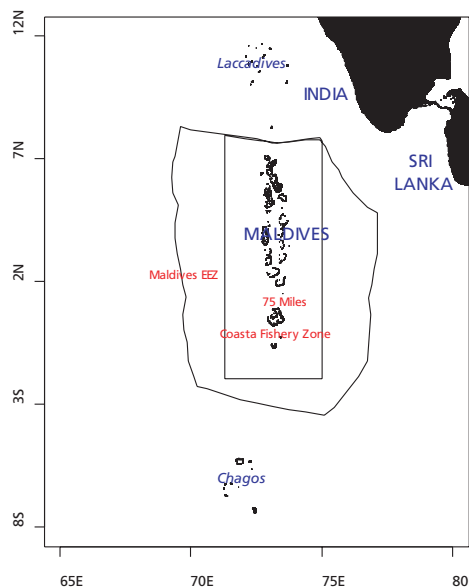
The Environmental Protection and Conservation Act, EPCA (Law Number 4/93) contains provisions for conservation of biological diversity and protected areas and natural reserves. The responsibility for the implementation of the EPCA falls under Ministry of Environment and Construction (MoEC). Both the EPCA and the Fisheries Law are taken together in formulating regulations and governing the capture fisheries. Guidance is sought from the Fisheries Advisory Board which meets on *ad hoc* basis. The FAB is represented by high level government officials representing line ministers. The chairman of the board is the Minister of Fisheries, Agriculture, and Marine Resources.

The Marine Research Centre (MRC) is the research arm of the MoFAMR; however, due to human resource constraints at MRC, proper and regular stock assessments are not carried out. Instead MRC provides *ad hoc* reviews and general assessments of the resources as and when required by the Ministry.

Lack of human and financial resource impedes the effective implementation of the rules and regulations. In the Maldives, new rules and regulations are announced through media, but are not supported by dissemination of this information through local government authorities. Therefore, the lack of awareness and existing rules and regulation by the general public contributes non-compliance. Also lack of monitoring and enforcement, coordination between the administrators and lack of real deterrents to non-compliance contributes to the issue.

In order to address shortcomings of the current Fisheries Law and its implementation, a comprehensive revision of the law is underway and most of the drafting work is now complete. The new Law emphasizes the conservation and management of the living

FIGURE 1
Location map of the Maldives showing the 200 nautical miles Exclusive Zone (EEZ) and the Coastal Fisheries Zone – the area between the atoll boundary and the 75 miles zone.



⁹ The MoFAMR and the Ministry of Atolls Administration share the responsibility in coordinating the implementation of the Law.

marine resources and allows for devolution of fisheries management. In addition, the new Law will also address weaknesses in fisheries law penalties. Current penalties include mostly one-off cash fines that are not high enough to act as a deterrent.

STATUS OF THE FISHERIES

Fisheries used to be the highest contributor to the Maldivian GDP. However, in 1985, the tourism sector surpassed fisheries in terms of its GDP contribution. In spite the continued increase in total catch the contribution to GDP has been declining; from almost 16 percent in 1989 it fell to just lower than 9 percent in 2004¹⁰. This decline in the proportion to GDP contribution by fisheries is due to spectacular increase in the tourism sector over the last 20 years. In real terms the value of the two major fisheries increased from 24 million US\$ in 1989 to just over 40 million US\$ in 2003 (Table 2).

Tuna species remain the major fishery resources exploited in the country as more than 80 percent of the total capture fisheries are tunas; of these, the main component of the catch is skipjack tuna (Table 1). The total recorded volume of the tuna fisheries has been increasing. Total tunas caught increased from 103 885 tonnes in 1998 to 138 751 tonnes in 2003. While this increase of tuna catch within the five years is 11 percent, non-tuna varieties (i.e., reef fisheries' catch, including sharks) increased to 17 percent (from 14 230 tonnes in 1998 to 16 664 tonnes in 2003).

Tunas are believed to be part of the wider Indian Ocean stock(s); therefore, strictly national-based management measures are ineffective for managing these migratory species. The most recent Indian Ocean wide assessment of bigeye tuna showed that the stock has reached to maximum sustainable level and that a continued increase in catch of juveniles in purse-seine surface fishery is a major concern (IOTC, 2003). The situation with yellowfin is unclear, but it is believed current catches are close to maximum sustainable yield (IOTC, 2003). Maldives should become a full member of the IOTC so that its national objectives could be addressed within the overall IOTC framework of tuna management in the Indian Ocean.

The tuna pole-and-line method requires copious amount of live bait which are caught from lagoons and reefs (80 -150 kg/fishing trip¹²). As there are no holding pens (or cages), bait fish are caught daily by the fishing vessel prior to almost every tuna fishing trip. There are no official statistics for bait fish catch and so bait catch is estimated using average weight of bait used per trip (Anderson 1996). The main species caught in the bait fishery are Sprats (*Spratelloides gracilis*, *S. delicatulus*), and various species of Casesionids, Apogonids, and *Engraulidae* (*Encrasicholina heteroloba*).

The third most important fishery in terms of catch volume is the shark fishery comprising deep water sharks (*Centrophorus* spp.), reef sharks, nearshore pelagic sharks, and offshore oceanic sharks. Reef sharks are considered to be grossly overexploited in the Maldives (McAlister Elliot & Partners, 2002).

An export-oriented grouper fishery started in 1994. Groupers aggregate to spawn and are targeted using drop handline gear. The fishery peaked in 1997 exporting over 0.9 million groupers a year. The fishery continued to decline since then. In 2003 less than 0.3 million groupers were exported¹³. It is concluded that the fishery is heavily over-exploited requiring urgent management action.

¹⁰ The figure includes fish processing. Excluding the processing the contribution to the fisheries sector to GDP in 2003 is 6.6%.

¹¹ Note: In this report, the term tuna fishery includes the four components of the fishery (pole and line, longline, handline, and troll).

¹² Marine Research Centre, Unpublished data. Fishing trip constitutes a single day in which boats leave early in the morning (sometimes 1:00 in the morning if bait fish are caught using lights) and return by noon or late evening.

¹³ MRC (in prep.) Review of Grouper Resources of Maldives.

TABLE 2

Characteristics of the three major fisheries (by volume) in Maldives (2003)

Fishery	Catch (t)	% of Total	Export Value (US\$)†
Tuna fishery ¹¹	138 751	81.4	39 060 747
Bait fishery	15 000*	8.8	NA
Shark fishery	2 100*	1.2	1 217 426

Notes: *Estimated catch, †Value of export products only; 1 US\$ = 12.75 Maldivian Rufiyaa.

Sources: MoFAMR 2003; MRC unpublished data (for estimating bait fish catch).

The export-oriented aquarium fishery is considered small-scale. Unlike in other parts of Southeast Asia, exporters and collectors are the same group. Over 175 000 fish and invertebrates were exported in 2002 earning about US\$ 0.509 million making up to 0.91 percent of the total marine export value. The fishery is managed by species-specific export quota.

MANAGEMENT ACTIVITIES

The fishery management activity in the Maldives is mostly limited to bans, prohibitions, setting up quotas, licensing schemes, and levying fees (royalties on fish exports). In setting up these measures, stakeholders are consulted either directly or indirectly through small workshops and other formal and informal consultations.

Roughly 50 percent of the fishery could be considered as having some form of such management activity (Table 3); however, no fishery is covered by a management plan. This number of fisheries managed has been increasing over the last couple of years as

TABLE 3

Management activities in Maldivian marine capture fisheries

Management activities for Midway Island marine capture fisheries				
	Fishery	Target species	Bycatch	Management/regulatory Activity
Tuna Fishery	Pole-and-line	Skipjack tuna, yellowfin tuna (juveniles), bigeye tuna (juveniles), kawakawa, frigate tuna	Dolphin fish, Rainbow runner	None except regulation on fishing vessel licensing. Use of nets (i.e., purse seine not permitted)
	Longline	Deep swimming large yellowfin and large bigeye tuna	Oceanic sharks, moon fish, others	Strictly licensed, with VMS equipment; royalties on total catch (or export); subject to a quota of 1000 tonnes per year
	Handline	Large yellowfin tuna		Licensed vessels and royalties on export.
	Troll Fishery	Kawakawa, Frigate tuna	Bullet tuna	None
Reef fishery	Shark fishery	Offshore oceanic sharks, nearshore pelagic sharks, reef sharks, deep water slope sharks		Banned from within 12 miles of 7 major atolls for ten years starting from September 8, 1998; banned from 2 seamount tuna fishing grounds and within 3 miles radius from the FADs
	Bait fishery	Sprats (two spp.), Apogonids (various), Caesionids (various), Engraulidae, Damsel fish		None
	Grouper fishery	<i>Plectropomus</i> spp, <i>Cephalapholis</i> spp, <i>Epinephalus</i> spp., others		None, except registration of holding cages (not enforced)
	Aquarium fishery	Various small-bodied reef fish varieties		Species specific export quota. Enforced by Ministry of Trade and Industries and Customs.
	Beche-de-mer Fishery	<i>Holothuridae</i>		Restriction on method of harvesting
	Lobster fishery	Spiny lobsters (<i>Panulirus</i> spp.)		Restriction on minimum size of catch and method of harvesting
	General handline fishery	Carangids (jacks), Lujanids (jobfish, snappers), Lethrinids (breams), Xiphidae (sail fish/ marlins), wahoo (<i>scombridae</i>)		None, Export bans on rare species (e.g., Napoleon wrasse)
	Scad Fishery	Round and bigeye scads (<i>Carangidae</i>), Indian mackerel (<i>Scombridae</i>)		Gear restrictions

a reaction to conflicts with other fishery stakeholders or to over-exploitation of the resource.

The Marine Research Centre (MRC) of the MoFAMR has the responsibility of assessing the fishery resources. However, due to human resource constraints at MRC, proper and regular stock assessments are not carried out. Instead MRC provides *ad hoc* reviews and general assessments of the resources as and when required by the Ministry.

It is believed that shark fishery and grouper fisheries are heavily depleted. Roughly 25 percent of the capture fisheries could be considered as heavily depleted. Management measures adopted to address overfishing and rebuilding of depleted stocks include export bans, moratoriums, area closures, and restrictions on harvesting methods. There has not been a serious assessment to investigate whether these measures have resulted in improving the status of these stocks.

A major problem confronting the fisheries managers in the Maldives is the difficulty of enforcing the management measures. This is due to geographic spread of the islands and lack of human and financial resources, but also due to weaknesses in fisheries law penalties. A comprehensive revision of Fisheries Law is being undertaken to address these issues.

There are some rights-based measures still practiced although not strictly enforced they are now part of the fishery regulations. For instance, the fishery resources within the inhabited island reef and lagoon are considered a right of the community and they have the exclusive right for fish. The current regulation states anyone else wishing to fish should have prior and written permission from the island chief.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The principle funding source for management of the fisheries resources in the Maldives is the general government budget and there is no monetary contribution from the private sector. The costs of the management, in real terms, have increased over the past ten years as a result of increased administrative costs incurred due to implementation of the management measures in new fisheries. For example, in the reef fishery, where the resource base is limited and characterized by multiple users, considerable conflicts exist between the fisheries and tourism sector as non-extractive uses of the fishery resources has proved valuable. This has resulted increased monitoring and new regulations to manage the reef fisheries resources.

The Maldivian tuna fishermen operate within close range (< 50 miles) of the atolls and so the vast area of Maldivian EEZ is relatively unfished. Maldivian fishermen strongly believe that illegal fishing in the EEZ by foreign vessels affect their catchability and school formation in the nearshore areas. As a result Maldivian Coast Guard, which is under the Ministry of Defense and National Security gives high priority to monitor illegal activities. Although there is no routine surveillance, the Coast Guard has been responsive in dispatching their vessels when fishermen report illegal activity. The cost of monitoring has considerably increased as the number of vessel apprehended over the years has increased. During the period 1991 – 2000 roughly seven (range 2 – 17 per year) vessels per year were apprehended by the Coast Guard¹⁴.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

The Maldives has ratified UNCLOS and Fish Stocks Agreement. However, the Maldives is not party to the Compliance Agreement and there are no specific steps or actions undertaken for implementing these conventions.

Some measures have been taken to implement the International Plan of Actions. Maldives does not have high seas fishing fleet and the EEZ fishing is regulated through

¹⁴ Maldives Coast Guard, unpublished information.

licensing and reporting of catch and effort data is mandatory. Measures have been taken to discourage shark fishing: a ten-year ban on any form of shark fishing in seven atolls within 12 miles to the coast was enacted in September, 1998.

PARTICIPATION IN REGIONAL FISHERY BODIES

Maldives has been participating in the regional fishery management organizations. In the past Maldives was a paying member of Indian Ocean Tuna Development and Management Programme (IPTP). The organization that replaced the activities of IPTP is the Indian Ocean Tuna Commission which has mandate for fisheries management and empowered to establish management measures. Maldives does not have a status with the IOTC and is neither a member nor a non-contracting cooperating member. However, Maldives has actively taken part in most of its working party meetings including provision of published data.

Maldives is also a member of the advisory body Bay of Bengal Programme Inter-Governmental Organization (BOBP-IGO), the scientific body INFOFISH, environmental/fisheries arrangement SACEP and the more recent BOBLME Programme.

Currently there is no legal mechanism to implement the management measures adopted by regional fisheries bodies such as the IOTC.

SUMMARY AND CONCLUSIONS

Tuna species dominate the capture fisheries of the Maldives. Although the pole-and-line method catches the bulk of the production, longline and handline fisheries are being developed as a means to diversify the fishery and an increase export earnings.

The exploitation of reef fisheries has also intensified over the last 15 years. Several of these fisheries are export-oriented and target high-valued species, exported to Asian markets. Roughly 20 percent of the capture fisheries in the Maldives may be considered over-exploited and all are reef fisheries. This number is expected to increase in the future. Funding for monitoring, research and management is entirely sourced from the government budget and private sector contribution for management of the resource is nil. There is no legal mechanism to allocate resource rent for research, monitoring, and enforcement.

The fishery management activities in the Maldives comprise licensing schemes, quotas, and prohibitions, bans, and levying royalties. The effective implementation (i.e., monitoring and enforcement) of these measures has proved difficult due to lack of human and financial resources but also due to weakness in the existing legal framework. A comprehensive revision fisheries law is underway which would overcome these difficulties.

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APPENDIX TABLES

Current management of marine capture fisheries in Maldives

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations†	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	50%	0	15%	increasing
Regional	0	0	0	n.a
Local	0	0	0	n.a

† Published regulations here means that it is in a form a report that is commonly referred for various agencies for the purpose of managing (for instance, assigning licenses/quotas) a fishery.

Summary information for three largest fisheries (by volume) in Maldives (Year 2003)

Category of Fishery	Fishery	Volume mil tonnes	Value* mil USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial/Commercial	Tuna	0.1336	25.27	78.81	32.92	Not effectively	14 890	1 721
	Bait	0.0150	n.a	8.8	n.a	No	14 890	1 721
	Shark	0.0021	1.22	1.2	1.58	No	500	100
Commercial/Artisanal	Reef fishery	0.0010	n.a	5.9	n.a	No	> 1 000	>500
	Handline tuna	0.0044	13.79	2.59	17.96	Yes	n.a	n.a
	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Recreational	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Value in 2003 U.S. Dollars. 1US\$ = MRF 12.75

** % values are based on totals for each category of fishery.

Sources: Fisheries Statistics 2003, Economic Research and Statistics Services, MoFAMR. Bait fish data are estimated.

Use of fishery management tools within the three largest fisheries in Maldives

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial/Commercial	Tuna	No	No	Yes	No	No	No	No	Yes (on exports)	No
	Bait	No	No	Yes	No	No	No	Yes	No	No
	Shark	Yes	Yes	No	No	No	No	No	No	No
Artisanal	Reef fishery	No	No	Yes†/No	No	No	No	Yes	No	No
Recreational	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

†for some species.

Costs and funding sources of fisheries management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial/Commercial	Tuna	Yes	No	Yes	No	No	No
	Bait	Yes	No	Yes	No	No	No
	Shark	Yes	No	Yes	No	No	No
Artisanal	Reef fishery	Yes	No	Yes	No	No	No
Recreational	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Compliance and enforcement within the three largest fisheries in Maldives

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial/Commercial	Tuna	Yes† / No	No	No	No	No	None
	Bait	No	No	No	No	No	
	Shark	No	No	No	No	No	
Artisanal	Reef fishery	No	No	No	No	No	
Recreational	n/a	n/a	n/a	n/a	n/a	n/a	n/a

†EEZ component of the fishery.

Capacity management within the three largest fisheries in Maldives

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Tuna	No (?)	No	Constant	No	
	Bait	No (?)	No	Increasing	No	
	Shark	Yes	No	Decreasing	Yes	To rehabilitate shark stocks
Artisanal	Reef fishery	No	No	Don't know	No	
Recreational	n/a	n/a	n/a	n/a	n/a	n/a

Country review: Mauritius

Ismet Jehangeer

Ministry of Fisheries, Mauritius

April 2004

INTRODUCTION

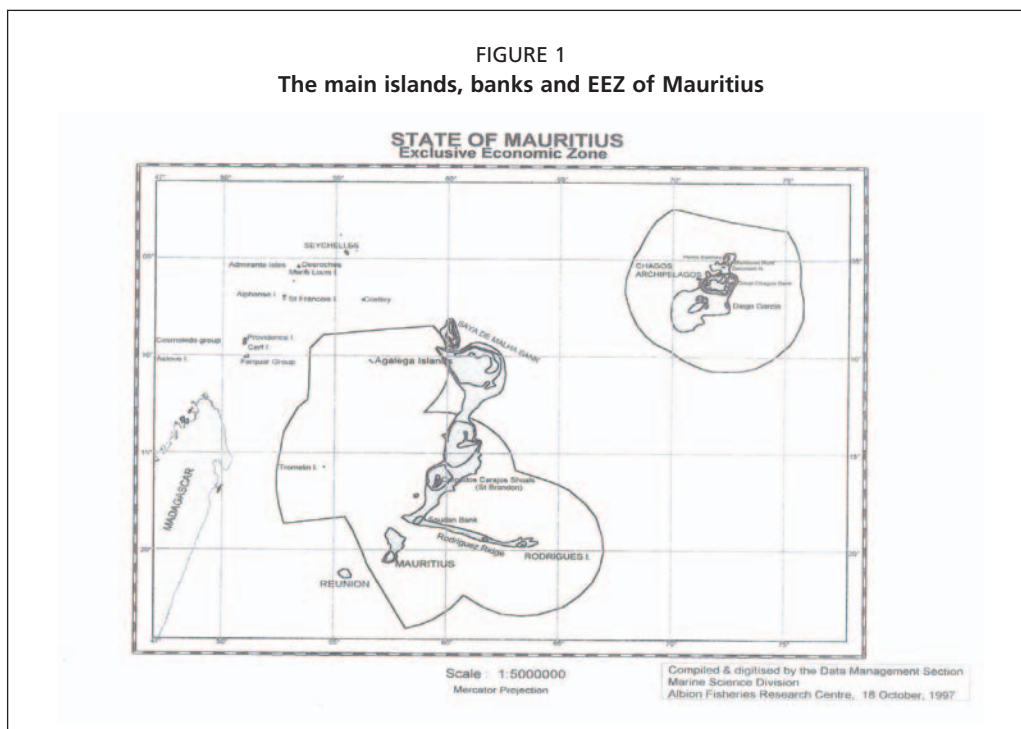
This review of marine capture fisheries management in the Republic of Mauritius is a component of the FAO's project on the state of the world marine capture fisheries management. The overall goal of the project is to provide an informative reference to any reader including decision-makers, fisheries managers, and stakeholders on overall status of fisheries in given countries/regions including legal and administrative framework, current management strategies and tools employed, options for initiating change etc.

Information for this review were basically obtained from annual reports and other documents of the Ministry of Fisheries, interviews of senior personnel of the management and research services of the same ministry, the FAO questionnaire (which forms an integral part of the project), and the author's own source and experience. Additional information was provided from the country's profile and management brief on the FAO website.

Mauritius is a small island of volcanic origin located at latitude 20° South and longitude 57° East at about 680 km East of Madagascar. It covers an area of 1 864 km² and is surrounded by 150 km of fringing coral reef. It has a population of around 1.2 million. Mauritius has an Exclusive Economic Zone of about 1.9 million km² extending from baseline of its outer islands/islets of Rodrigues, St Brandon, Agalega, Chagos Archipelago and Tromelin (Fig.1). However, as is the case with most island states in the tropical areas, it has a limited continental shelf around the islands except for larger shelf areas on certain banks situated far to the north. Fisheries resources/stocks exploited are the island-based artisanal fisheries (principally Mauritius, Rodrigues, St Brandon, and Agalega), the offshore shallow banks of the Mascarene ridge (Nazareth, Saya de Malha, Soudan and Hawkins banks) and the Chagos Archipelago, and the tuna fishery of the Western Indian Ocean. Of late, the deep sea demersal resources of the Southern Indian Ocean are also exploited at depths varying from 800 to 2 000 m by Mauritian trawlers.

From the nutritional and social stand points, fisheries are very important to Mauritius. However, local production (10 000 tonnes in 2002) is not sufficient to cover demand for fish and fish products. The country has to import about 50 percent of its consumption need (some 9 400 tonnes in 2002) in addition to raw materials (about 60 000 tonnes tuna and snoek in 2002) which are used for processing. Fisheries provide employment to around 10 000 persons (full-time fishers and employees in the processing i.e. freezing, salting, smoking and canning and other ancillary services associated with the fisheries sector). Export earnings in 2002 amounted to US\$140.7 million (MR 4 billions) basically from canned tuna (the canning factory depending almost entirely on importation of raw material). The value of imports amounted to US\$132 million (MR 3.8 billion) during the same year, resulting in a positive balance of trade of US\$8.6 million in the fisheries sector. This represents less than one percent contribution of the total GDP. However, the per capita consumption of fish was 20 kg in 2002 (which is higher than an average of 13 kg in developed countries).

FIGURE 1
The main islands, banks and EEZ of Mauritius



POLICY FRAMEWORK

One of the principal fisheries policy document which sets out the broad goal of fisheries management and development for the whole country is the Ten-year Fisheries Development Plan for the Fisheries Sector which was prepared and finalized with the assistance of the FAO/UNDP in 1998.

The overriding conclusion reached in the report was that limited potential exists for further development of marine capture fisheries except for the offshore highly migratory pelagic species such as tuna and swordfish and that emphasis should be placed on:

- Sustainable use of existing resources and protection of the marine environment;
- Maximizing returns from existing fisheries through value addition; and
- Limited and cautious development of under-utilized resources and diversification into aquaculture, where feasible.

The Plan also outlined a budget of MRs 437 million for the implementation of some 126 projects covering eight programmes (in various fields, such as research, marine capture fisheries, marine conservation, institutional reforms) to achieve the proposed management and development recommendations. It was stressed that whilst limited potential for further development exists, a budget of this magnitude was justified since in the absence of environmental and fishery management both the marine coastal environment and fishery resources would be severely degraded. The result would not only be a loss to the economy from decreased fisheries activities, but also serious damage to the tourist industry, which contributed to more than 11 billion rupees (now some 19 billion) to the national economy.

The objectives of the Ministry of Fisheries (as stated at its website), which is responsible for the management and development of fisheries and marine resources are, amongst others:

- to ensure the proper implementation of government policies in respect of fisheries and marine conservation;
- to provide the legal framework and mechanisms for the management and protection of marine living resources;

- to promote responsible fisheries;
- to promote the welfare of fishers;
- to ensure the contribution of fisheries to national socio-economic development;
- to ensure an adequate supply of fish to the population;
- to support and strengthen national research capacity for fisheries development and management and conservation of marine biodiversity; and to ensure that Mauritius cooperates regionally and internationally for the development management and conservation of marine living resources and the promotion of responsible fisheries.

Fisheries in Mauritius have been subject to legislation for more than a century. Regulations were passed in 1886 to ban the sale of certain species of fish due to fish poisoning outbreaks. An ordinance passed in 1918 proclaimed measures relating to *inter alia*, dimensions of nets, closed fishing seasons, fishing reserves, undersized fish, fish landing stations, and registration of boats. A Fisheries Ordinance was passed in 1948 followed by a Fisheries Act in 1980.

Fishing activities have long been concentrated in the coastal waters and on the fishing banks to the north of Mauritius. However, with the development of the tuna fishery in the Western Indian Ocean and the need to monitor and control fishing activities in line with UNCLOS and Agreements emanating from it and the Code of Conduct for Responsible Fisheries, it had become imperative to revisit the Fisheries Act of 1980 and redraft the legislation to suit the present and future needs in development, management and conservation of fisheries and marine resources. The Fisheries Act was thus reviewed with the assistance of a FAO legal consultant (Christy 1986) and a new Fisheries and Marine Resources Act was passed in 1998, to incorporate some recent international fisheries management norms and mandates, though no specific reference to any international instrument was made in the Act.

LEGAL FRAMEWORK

The legal instruments

As mentioned earlier, the basic legal instrument for the management of fisheries in the waters of Mauritius is the Fisheries and Marine resources Act of 1998 (FMRA). The purpose of this Act is to provide for the management, conservation, protection of fisheries and marine resources, and protection of the marine ecosystem in the waters of Mauritius.

The FMRA is divided into ten parts. The most important parts concerning fisheries management are:

- **Part II** (management of fisheries and marine resources) lays down the basic management functions relating to both coastal and offshore fisheries. Provisions are made for the setting up of Consultative Committees so as to help the minister to maintain a constant dialogue with stakeholders in the fishing industry on matters of general policy relating to fisheries and marine resources. The Section also provides for registration of fishers, collection of basic data on fisheries (catch, effort, area of fishing, species of fish caught, fishing boats) and other biological information. Subsections of this part covers protection of the aquatic ecosystem from pollution, protection of mangroves and the setting up of marine protected areas (MPAs) such as fishing reserves and marine parks and reserves. The Minister may prescribe, through regulations measures for the protection, conservation and management of marine resources including, amongst others, the prohibition of fishing by certain means, in certain areas and or during certain periods, the prohibition of fishing of a specific species, size or gender of fish, conditions to be attached to possession, manufacture, purchase of any gear, schemes for setting and allocation quotas and for limiting entry into all or specified fisheries and the prohibition of any activity likely to disturb the marine ecosystems and habitats.

- **Part IV** (Control of fishing activities), provides for prohibited fishing methods e.g. with poisonous substances, spears or explosives and artificial light, closed periods for net fishing and oysters fishing, prohibition of underwater fishing and for fishing undersized fish, crabs or lobsters in berried state, turtles, mammals, sale of toxic fish and fish products unfit for human consumption, imposition of closed periods for nets use and restrictions on their operations in passes, and obligations on fishers to land their catch only at prescribed fish landing stations.
- **Part VI** (licensing): Sub-part A sets out the conditions for licensing, the mode of application for licenses and limitation on the number of licenses to be issued in respect of nets to be used in the lagoon. The policy of Government is to phase out use of net in the lagoons through a voluntary buy-back programme so as to reduce negative environmental impact on the ecosystem.
- **Part VI:** Sub-part B makes provisions for licenses issued to local and foreign fishing boats (defined as not exceeding 20 m in length) and vessels (exceeding 20m in length). A local boat or vessel needs a fishing license to fish (1) within Mauritian waters or on the continental shelf, (2) in any fishery on the high seas and (3) within the fishing zone of a foreign state. The issue of licenses (in a prescribed form) is subject to a number of conditions; *inter alia*, the type and method of fishing, areas where fishing is authorized and species and amount of fish to be caught and the period of its validity.

A foreign vessel must obtain a licence for fishing within the Mauritius waters. The application for the licence is made to the Minister on a form which is approved by the Permanent Secretary of the Ministry for Fisheries. The licence which is issued in a prescribed form (on terms and conditions determined by the Minister) is also subject to the approval of the Prime Minister, (who is responsible for the EEZ) as per section 37 of the Act.

This sub-part also provides for the Government of Mauritius to enter into agreements with other countries, intergovernmental organizations or fishing associations to allow their vessels to fish in Mauritian waters.

- **Part VII** (Obligations relating to boats and vessels): Owners of fishing boats and vessels should have them registered with the Fisheries Services. Fishing boats should properly display identification marks. Landings of fish catches should be done in Mauritius unless otherwise authorized. Mauritian vessels should abide by a number of conditions relating to safety and insurance of their crew before leaving for a fishing trip. They have to abide by several conditions such as giving information on their catch and effort, production of their logbooks for examination and inspection of their catch on return from fishing campaign. The Permanent secretary may authorize an observer to board and remain on board a vessel.
- **Part X** (Miscellaneous): The Minister is empowered to make regulations generally for the implementation of the Act.

Although the Act does not explicitly refer to the long-term conservation and sustainable use of fisheries resources, the whole spirit behind the Act rests upon such conservation and use as envisioned in the policy statement of the government. Also, although the legislation does not set up a series of steps or process to be followed for elaboration of fisheries management regulations or plans or for resolutions of conflicts among stakeholders, it has numerous provisions that can be used to set up such processes administratively. Again, though the Fisheries Act does not explicitly require management decisions to be based on information coming from biological analyses or social or economic impacts, production of information on fisheries (section II of the Act) is made mandatory so as to facilitate management decisions.

Among the non-fisheries legislations that impact on fisheries management are:

- **The Merchant Shipping Act 1986** which deals with the question of registration of fishing vessels. Under this Act, a ship registered on a foreign register which

is bareboat chartered by a citizen of Mauritius or a body corporate qualified to own a Mauritian ship, may have a parallel registration in the Register. This may pose problems associated with flags of convenience if not judiciously used and the responsibility of the state to exercise control over the ship so flagged.

- **The Ports Act (1998)** which regulates fishing in and around the port and sets ports fees. This has a bearing on the operational cost of the vessels.
- **Immigration Act** which requires vessels to undergo entry and exit formalities for each fishing trip in the EEZ. This contributes to control and surveillance.
- **The Custom Tariff Act** provides in its schedules for import and export duties on a range of goods that have direct bearing on running of fishing vessels, export of fish and fish products and transshipment, amongst others.
- **Investment laws** such as the **Investment Promotion Act** of 2000 establishing an authority to promote export and investment (in economic sectors including fishing) and the **Freeport Act** (2001) which enable operators to carry out activities oriented toward export in the free zone with exemptions from payment of custom duties, excise duties and VAT.
- **The Food Act (1998)** regulates food quality and regulations have been made concerning fish quality, labeling, and frozen food standard.
- **The Environment Protection Act (2002):** The Act requires the promoter of any undertaking which is likely to affect the environment to apply for an Environment Impact Assessment (EIA) licence from the Department of Environment. Coastal developments, including industrial and tourism infrastructure developments are the major sources of conflict with artisanal fishing activities. Although the Ministry of Environment is responsible for the Government's global environment policy, the Ministry of Fisheries is one of its enforcement agencies regard the marine environment.
- **The Maritime Zones Act (1977)** and the **Maritime Zones (EEZ) Regulations 1984** which defines the various zones such as the territorial sea, the EEZ and the continental shelf and spell out the sovereignty and sovereign rights of the State of Mauritius with regard to these zones. Approval of the Prime Minister's Office is required for any activity such as foreign fishing and scientific research and exploration in Mauritian waters. A new Maritime Zones Act has been adopted by the National Assembly recently.
- **The National Coast Guard Act (1988):** The NCG is responsible for:
 - the enforcement of any laws related to security of the state of Mauritius;
 - the enforcement of any laws relating to protection of the maritime zones;
 - the detection, prevention and suppression of any illegal activity within the maritime zones (including illegal fishing).

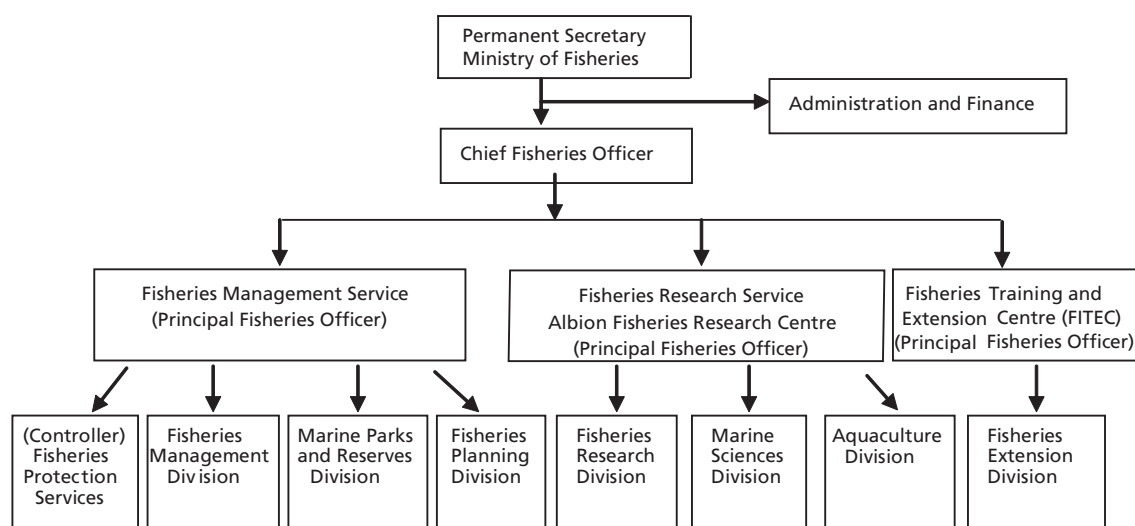
Administrative arrangements

(a) National level

The **Ministry of Fisheries** is the organization responsible for:

1. the formulation and implementation of policies in relation to matters pertaining to fisheries and marine living resources;
2. the development of plans and strategies for management of fisheries and marine conservation;
3. the drafting, subject to vetting of the Attorney General's Office, of primary and subsidiary legislation related to matters referred to above.

The main administration centre or head office is situated in Port-Louis. The ministry is headed by a Permanent Secretary who reports directly to the minister. A Chief Fisheries Officer, who reports to the former, is responsible for the technical services which carry out the basic functions of the ministry. These are: the Fisheries Research Services operated from the Albion Fisheries Research Centre (AFRC) and the Fisheries



Management Service (FMS) at the head office of the Ministry of Fisheries. The latter is basically responsible for monitoring of fisheries and enforcement of the Fisheries and Marine Resources Act which is carried out by the Fisheries Protection Service (FPS). The FPS operates on a 24 basis through 13 Fisheries Posts situated around the mainland of Mauritius with a staff strength of 255 fisheries protection officers. The Fisheries Management Division within the FMS also caters for licensing and monitoring and control of fishing vessels. Staff of this division is also involved jointly with that of the Fisheries Protection Service in vessel inspection and monitoring in the port area. Recently, a new Fisheries Training and Extension Centre (FITEC) was created for the training of fishers (see organigram of the Ministry of Fisheries).

The National Coast Guard (NCG), which is a specialized agency within the Police Force, provides additional assistance for enforcement of national fisheries laws and regulations. The NCG reports to the Prime Minister's Office (PMO) who is responsible for the EEZ. The NCG operates from a central command station at Port-Louis with 19 field stations, including Rodrigues and the outer islands at all times. It is equipped with a large armed patrol vessel and two smaller vessels capable of patrolling the zone. The NCG also operates two high wing aircraft. Being part of the Police Force, the NCG can mobilize other crafts and vehicles if necessary.

The NCG, therefore, supplements and reinforces the enforcement capacity for the fisheries law and regulations beyond the limits of the territorial sea (in the EEZ) and especially in the distant outer islands.

(b) Regional level

As per the Rodrigues Regional Assembly Act of 2001, the Rodrigues Regional Assembly (RRA) established under this Act is responsible for the formulation and implementation of policy in respect, amongst others, to marine parks and fisheries in the Island of Rodrigues. Though the RRA may pass regulations regarding fisheries, it is mandated to operate in addition to, but not in derogation of any law of the Republic of Mauritius.

STATUS OF FISHERIES IN MAURITIUS

Table 1 provides a summary of the different fisheries exploited in Mauritius.

Artisanal fisheries

Artisanal fishers exploit the fishing grounds in the lagoon and off lagoon beyond the reef barriers on the narrow shelf area around the islands. The multi-species stocks

TABLE 1
Summary of fisheries exploited in Mauritius (2002)

Category	Fishery	Volume (tonnes)	%Volume caught	Value USD	% total value caught
Industrial	Shallow banks	3 286	33	7 365 172	25
/semi-industrial	Demersal (trawler)	2 113	21	7 286 206	25
	Chilled fish (nearer banks)	204	2.	844 137	3
	Tuna	219	2	453 103	1.5
	Swordfish	45	0.4	108 620	0.4
Artisanal	Lagoon/off lagoon (Mauritius)	1 302	13	5 387 586	18
	Lagoon/off lagoon (Rodrigues)	1 404	14	3 873 103	13
	Lagoon (St Brandon)	491	5	1 100 517	4
	Lagoon (Agalega)	30	0.3	67 241	0.2
	FAD (Mauritius)	250	2.5	603 448	2
Recreational	Sports (off lagoon) Mauritius	400	4	827 586	3
	Recreational (Lagoon) Mauritius	300	3	1 241 379	4
Total		10 044		29 158 098	

Note: 1 US\$=MR 29 (2002)

comprise mainly *Lethrinus* spp., *Mugil* spp (mullet), *Siganus* spp (rabbit fish), *Naso* spp. (unicorn fish), *Scarus* spp.(surgeon fish), *Epinephelus* spp.(grouper) and *Parapenaeus* spp.(goatfish), *Penaeid* shrimps, oysters and octopus are also fished to a lesser extent. The fishers use only traditional fishing such as hooks and lines, basket traps, large nets, gillnets, canard nets and harpoons.

A total of 3 895 artisanal fishers (using some 2 073 boats of 6-7 m in length) in Mauritius and Rodrigues were involved in these fisheries in 2002. The artisanal sector is the main source of fresh fish supply for the local market. The total production from the two largest islands (Mauritius and Rodrigues) amounted to 6 056 tonnes in that year.

FAD (Fish Aggregating Device) fisheries contributed about 250 tonnes of pelagic fish towards the total landings and is being promoted as a means for diversification of production and reduction of effort in the lagoon fishery. Catch rates in this fishery (catch per fisher day CPFD: 10-20 kg) is higher than in the lagoon artisanal fishery which is in the range of four to six kg. FADs are set and maintained by government. In 2002, twenty FADs were operational around Mauritius. About 330 artisanal fishers are engaged in this fishery, and around 130 of them have benefited from concessionary loans offered by the Development Bank of Mauritius under an IFAD programme to buy boats and equipment.

A company based on the St Brandon islets employs between 30 to 40 contractual fishers who exploit, in addition to the lagoon, the external shelf to a depth of 35 m. Two vessels (22 m and 31 m LOA) belonging to the same company are also authorised to chill part of their catch per trip on return to Mauritius. The fishers also salt any catch when the vessels are not in St Brandon. In 2002 the production was 491 tonnes comprising of fish (frozen, chilled, and salted) lobster and octopus.

In Agalega, about 30 tonnes of fish per year are produced exclusively for consumption of the local population of about 300 inhabitants.

Industrial/semi-industrial fisheries

(a) Banks based fisheries

The shallow oceanic banks of the Mascarene ridge are exploited by a fishery fleet of freezer motherships of 25-55 m overall length (LOA) range, each one of them embarking 10 to 20 fibreglass dories of 6-7 m, powered by outboard engines. Each dory is operated on the fishing ground by three fishermen who use individual handlines. In 2002, there were ten such mothership vessels in operation. Each fishing trip lasts an average of two months. The annual catch, which varies between 3 000 to

4 000 tonnes (3 286 tonnes in 2000) is mostly gilled, gutted and frozen on board. Up to 90 percent of the catch consists of *Lethrinus mahsena* (sprangled emperor) and *Lethrinus rubrioperculatus* (spotcheek emperor). The associated species in the catch are *Aprion* spp. (jobfish), *Variola* spp. (sea bass), *Caranx* spp (trevally), *Plectropomus* spp. (grouper) and *Epinephelus* spp (grouper).

Vessels with fish holding capacities of up to 15 tonnes are also allowed to operate on the banks closer to Mauritius (St Brandon, Albatross, Soudan and Hawkins areas) for trips lasting up to 12 days. In 2002, nine vessels landed 204 tonnes of chilled fish comprising mostly of *Lethrinid* spp. (emperors) with smaller proportions of snappers, groupers and tuna.

(b) Tuna/pelagic fisheries

Tuna and tuna like species are widely distributed in the EEZ of Mauritius. They are fished by Mauritian and foreign fishing vessels under licences. The oceanic tuna fishery started in 1979 with a Mauritian-Japanese joint venture. Three Mauritian purse-seiners operating in this fishery landed 10 279 tonnes of tuna in 1993 for a local tuna canning factory. There has been a gradual decline of this fishery till 2001 when production dropped to zero, all the seiners having left the fishery. Subsequently, three Mauritian longliners joined this fishery and produced 219 tonnes in 2002.

Three local vessels were licensed to exploit the swordfish (*Xiphias gladius*) resource in the EEZ. They effected 52 trips and landed 45.8 tonnes of pelagic fish consisting of sword fish (55 percent), albacore (16 percent), yellowfin (11 percent), bigeye (five percent), marlin (three percent) and sharks (one percent).

Mauritius is an important transshipment base for tuna. Foreign longliners (licensed and non-licensed) fishing in the South West Indian Ocean, transship their catches in Port Louis, whence freezer carrier ships transport the catches to Asian markets. Some 17 447 tonnes of tuna and tuna-like species were transshipped through Port Louis in 2002. The tuna consisted of 79 percent albacore (*Thunnus alalunga*) and 14 percent yellowfin (*Thunnus obesus*). Some 439 longliners and 2 purse seiners called at Port Louis in 2002, for transshipment and/or bunkering, provisions, change of crew and repairs.

Mauritius has fishing agreements with the European Union, Japan and the Seychelles for fishing access in the Mauritian EEZ. The licence fees for foreign fishing vessels are US\$3 000 for a period of 90 days and US\$1 000 for any additional 30 days or part thereof. Some 216 vessels were licensed in 2002.

(c) Deep sea demersal fishery

Two local demersal trawlers of GRT 3 989 and 1 899 respectively were actively engaged in this fishery in 2002. The total catch unloaded amounted to 2 113 tonnes consisting basically of orange roughy, *Holopsetthus atlanticus* (36 percent), bluenose, *Hyperoglyphe Antarctica* (19 percent), alphonsino, *Beryx splendens*, (18 percent) and rubyfish, *Plagiogeiion rubiginosus* (17 percent).

Recreational/tourist based fisheries and non consumptive fisheries

The big-game sports fishery produces about 400 tonnes of pelagic fish annually. The sports fishery is a major driving force in the tourism industry. Each year, international tournaments in big game fishing are organized. The catch in this fishery consists mainly of blue marlin (*Makaira nigricans*), black marlin (*Makaira indica*) and sailfish (*Istiophorus platypterus*), striped marlin (*Tetrapturus audax*) and yellowfin, bigeye and albacore tuna. Other species like skipjack, sharks and dolphinfish (*Coryphaena hippurus*) are also caught. Some 52 boats of 10-15 m LOA are involved in this fishery.

Ornamental reef fishes, besides being a major attraction to divers and snorkellers, are also exploited on a small scale for export. Two operators are licensed to catch up to 6 500 specimens of fish and invertebrates of various species annually for export. Some

59 dive sites, associated with coral or artificial reefs (sunken vessels) are operated by underwater or hotel groups. In addition, a promoter is authorized to operate a small submersible with a capacity of some 30 people for viewing of coral reef life.

A recent survey by the Ministry of Fisheries has shown that about 23 400 persons are involved in recreational fishing in the lagoon of Mauritius. Some of them (about 1 000) are owners of boats. Indications are that their catch may be more than the current estimate of 300 tonnes annually.

Unexploited fish stocks

Exploratory trawling of the banks carried out by the R/V Professor Mesyatsev between 1975 and 1977 (Birkett 1979) have indicated that the possibility exists for developing a trawl fishery for small pelagic fish (*Decapterus* spp.) and deepwater lobster on the Nazareth and Saya de Malha banks. The potential yield of the fish stock is estimated at 26 000 tonnes. However the feasibility of commercial fishing for their resources has yet to be demonstrated through a pilot project.

A stock of deepwater shrimp (*Heterocarpus laevigatus*) at depths of 600-800 m on the shelf of Mauritius and Rodrigues has been identified with a sustainable catch of approximately 200 tonnes/year. Attempts at exploiting this fishery have not been successful so far on account of the high cost of initial capital investment, short shelf life of the product and marketing difficulties.

Contribution of fisheries to GDP

All the 12 capture fisheries listed in table 1 are exploited at various levels of intensity. The three most important fisheries by volume and value are: the shallow banks fishery, the demersal (trawler fishery) and the artisanal fishery of Mauritius.

The total fish production was around 10 000 tonnes in 2002, valued at US\$29.15 million. Local production does not suffice to cover market needs and the shortfall is imported. The value of imports (83 753 tonnes) in 2002 was US\$132.1 million (comprising, amongst others, tuna for processing and around 9 400 tonnes fish and fish products for local consumption) as compared to an export value of US\$140.7 million (49 500 tonnes mostly of canned tuna) for the same year giving a positive surplus trade balance of US\$ 8.57 million.

Though the tuna fishery (two percent by volume) appears to be negligible, the activities centered around tuna transshipment, bunkering/port-related services for tuna fishing vessel and tuna canning generate enormous economic outputs. Thus the total amount spent by fishing vessels in port-related services is estimated to be around Rs 3 billion per year. The tuna industry employs about 2 300 people, processes some 46 000 MT of raw tuna annually with a sale turn over of approximately Rs 2 billion of which 95 percent are in foreign currency earnings.

It is estimated that the fishing industry as a whole contributes about one percent to the GDP (UNDP/ FAO 1998).

MANAGEMENT ACTIVITY

By virtue of the Fisheries and Marine Resources Act of 1998, the Ministry of Fisheries is responsible for the management and development of fisheries in the waters of Mauritius, i.e. at national level. The Minister may promulgate any regulation for the purpose of implementing the Act. However, as regard licensing of foreign vessels in the EEZ, the approval of the Prime Minister's Office (PMO) is required. Furthermore any research (including fisheries and the marine environment) should also be authorized by the PMO. At the regional level, the Rodrigues Regional Assembly is empowered to make regulations for the control of fishing activities in Rodrigues.

Although the Fisheries and Marine Resources Act neither defines the term 'fisheries management' nor does it spell out any objective of 'fisheries management'

as such, the overall objective of the Act itself is stated as providing for management, conservation, protection of fisheries and marine resources, and the protection of the marine ecosystem. The various provisions, especially in Part II, (see section III above) establishes an adequate framework for adopting and implementing management measures though, again, the Fisheries and Marine Resources Act does not set out a series of steps that have to be followed as part of the process for fisheries management or conflict management. There is no separate legislation for specific fisheries.

Management measures are generally implemented in consultation with stakeholders. Decisions reached may be followed the promulgation of specific fisheries regulations designed to better manage the fishery. In order to facilitate interactions with stakeholders, two committees: the **coastal fisheries consultative committee** and the **off-shore fisheries consultative committee** were set up in the mid 90's to allow the Minister of Fisheries to consult with the stakeholders on matters related to fisheries management and development and marine conservation. In addition, an Integrated Coastal Zone Management Committee (under section 50 of the Environmental Protection Act 2002) has been set up in 2003 under the chairmanship of the Minister of Environment to deal with coastal zone management. Nevertheless, more frequent consultations on current problems encountered by fishers are held on an ad-hoc basis to discuss issues related to fisheries management.

Consultations were held with stakeholders, including artisanal fishers, organizations representing professional fishers involved in banks fishing, NGOs and conservation groups, to elaborate of the following policy and management documents:

- the Fisheries and Marine Resources Act 1998;
- Plan for quotas allocations in the banks fishery;
- the 10-Year Fisheries Development Plan (the policy document mentioned in section II);
- the Marine Protected Area Regulations (2000).

In the last case, a compensation of Rs 200 000 was paid to each of the 37 fishers fishing in the region for loss of some fishing grounds when the regulations in the one of the marine parks were enforced. The level of compensation was based on amounts paid in 2000 to some 1 000 lagoon sand miners for phasing out their activity which was impacting negatively on the marine environment.

On the whole what was learnt from this and other similar consultation exercises (e.g. on hotel construction, dredging projects) is that fishers are becoming more organized to make their voice heard on all coastal developments works that are perceived to affect their livelihood. They are only willing to compromise provided a reasonable financial compensation is provided in their favour in certain cases.

Past legislations have concentrated basically on the artisanal fisheries. Most regulations have also focused principally on that fishery. In fact with the exception of the artisanal fishery, no regulations have been promulgated so far for the other fisheries enumerated in table 1. These fisheries are controlled either directly by implementation/enforcement of certain provisions/sections of the Fisheries Act, in particular section IV outlined earlier or by licensing under section VI relating to the coastal artisanal fisheries and the off shore fisheries by Mauritian and foreign vessels respectively (see legal framework section). Licenses are issued with specific conditions relating, amongst others, to conservation measures.

No licences/permits are issued in the recreational (lagoon) and sports fishery (off-lagoon). Therefore, with the exception of these two fisheries, all the fisheries can be considered as being managed in some way or other. However, regulations for the management of the recreational and sports fishery are in the process of being elaborated, more so, as their competition with existing artisanal fisheries is becoming more obvious.

There are currently no formal management plans written/elaborated for each fishery though the document prepared for consultation regarding quotas allocation (mentioned

above) among licensees in the banks fishery may be considered as a management plan. Another management plan covering the banks and St Brandon fisheries will be elaborated with the assistance of the FAO as from this year under TCP/ MAR/300/A: Stock Assessment and Fishery Management of St. Brandon Plateau and associated banks. This project will cover, amongst others, the following basic components: fish stock assessment of St Brandon plateau, banks fishery management programme and operational management process. Consultation with stakeholders will be an integral part of the process.

The management process takes into account available scientific data on specific fisheries. Time series of data on catch and effort are routinely collected on all the exploited fisheries from landing stations, the fishing port and from vessels/logbook inspections. The fishery statistics collection programme on the artisanal, multi-species, multi-gear fisheries (lagoon) in Mauritius has been implemented since 1977 based on a Catch Assessment Survey (CAS) designed by FAO. The results of the analysis provided estimates of total catch, catch by different gear and catch per fisher day (CPFD). Similarly the annual catches from the banks fishery, chilled fish fishery, and the tuna fisheries are compiled and the CPFD is estimated annually. All the processed data are also published in annual reports of the Ministry of Fisheries. Time series of such data coupled with estimates of MSY for the artisanal lagoon and banks fisheries (1 699 tonnes and 4 500 tonnes respectively) carried out in 1988 (Saunders *et. al.* 1988) suggest that the MSY level in these fisheries might have been reached already.

The data collected are used to follow trends in the fisheries being managed and not for determination of close seasons. It is to be noted that closed seasons are in force in only one fishery (artisanal lagoon) as per the Fisheries and Marine Resources Act (Section 18). Similarly, the number of licences to be issued for nets in the same fishery was defined in the Act (Section 32). Thus there are no closed period in the banks tuna and other fisheries mentioned earlier. However, with the exception of the tuna and the swordfish fishery, the numbers of licences to be issued to vessels in the banks and the chilled fish fishery have been based on the estimated MSY of these fisheries, capacity of typical vessels operating in each of the fishery and the average number of trips such vessels can perform. Once the maximum number of licences has been issued, adjustments in case of overfishing are made using quotas allocated to licensees rather than reduction of licences

Management tools in the lagoon fishery

The management tools utilized for the control of the lagoon fishery include marine protected areas (two marine parks and six fishing reserves have been promulgated), closed seasons (for large nets and gillnets), gear size and gear type restrictions (see section III), minimum size restrictions (of common commercial fishes), and limitation on number of licences for nets in Mauritius, Rodrigues and Agalega. The closed period of about five months in summer coincides with breeding periods of different populations of commercial fish species. As a social measure, a closed season allowance is also paid to fishers involved in the net fishing. The marine protected areas (where nets are not allowed to operate), provide additional protection to the adult as well as the juvenile fish populations throughout the year.

A buy-back programme for the voluntary relinquishing of nets and net permits against financial compensation to permit holders and fishers is in operation since 1996. This was combined with a further reduction of number of nets allowed in the Fisheries Act of 1998 (i.e. from 33 large nets, 33 canard nets and 20 gillnets for the island of Mauritius in the previous Act 1980 to ten large nets, ten canard nets and ten gillnets). Thus the buy-back programme will continue until such time that the numbers of nets match that fixed in the new Act. In the transitional period, net licence holders may continue to have their licence renewed. This programme basically aims at the

TABLE 2

Allowances paid to artisanal fishers in 2002 (Mauritius)

Allowances	Number of Days	Beneficiaries	US\$ Million
Bad weather	142	2 319	1.3
Close season	122	189	0.1

protection of the ecosystem and the reduction of effort in the lagoon fishery. In effect, the last aim could not be fully attained as most of the fishers who abandoned the large net and gillnet fishing resorted to basket trap and line fishing in the lagoon artisanal fishery (a multi-species, multi-gear fishery).

It needs to be mentioned here that government pays compensation (as a social measure) to fishers engaged in net fishing during the closed season. In the same vein, a bad weather allowance is also paid to all registered artisanal fishers during bad weather (declared using wind speed and roughness of sea as criteria). Net fishers do not get this benefit during the closed season. The allowances are strong incentives to keep fishers in the fishery and make any effort reduction programme difficult (see Table 2).

In fact, both the total catch and catch per fisher per day (CPFD) in the lagoon fishery showed a decline over the last ten years prior to 2002 (catch: 1775 to 1 302 tonnes; CPFD: 5.9 to 4.3 kg). Though the management regime does not seem to have improved the stock situation in the lagoon fishery, it is most likely that they have prevented further deterioration. This remark does not take into consideration increasing activities associated with coastal developments nor the lack of control over the recreational fishing that may be adversely impacting on the marine resources.

Management tools in the banks fishery

In the banks fishery, the following management tools are utilized: limited number of licences, limited entry, and total allowable catch. This management regime was dictated by the fact that for some years in the 80's and 90's, total annual catches (e.g. 5 449 tonnes in 1987) were reaching levels well beyond that of the estimated MSY of 4 500 tonnes for the banks. These management tools contributed to stabilizing the state of the stocks (See Box 1). This could be deduced from the gradual increase in CPFD and sensible increase of average size of fish caught, though the total catch (3 943 tonnes in 2002) declined principally on account of reduced fishing efforts.

Management tools in the EEZ fishery

As pointed out earlier, Mauritius presently has limited capacity to exploit the tuna resource. Licensing of foreign vessels under conditions compatible with international practices to access the EEZ is the best course of action available to the country. It meets one of the objectives set by the ministry for maximizing return from fisheries and "ensuring the contribution of fisheries to national socio-economic development."

Among the licence conditions which contribute to the conservation of the resource are a closed zone from the base line (to avoid conflict with coastal fishing), requirement for transshipment in Port-Louis harbour, submission of properly filled logbooks upon arrival of vessels in port, display of radio call signals, allowing boarding and inspection of the vessel and observers to stay on board, informing of vessel positions whenever it enters and exits the EEZ and additional vessel position information, together with a catch report, at three-day intervals. (This last condition will soon be reinforced with the introduction of a VMS requirement under a new regulation).

Trends in management tools

In general, management tools used in the control of fisheries are enduring gradually and some refinements have been effected as in the case of the banks fishery (see box 1). Licensing of vessels has however been increasingly used. Though a high level of

BOX 1

Application of Limited Entry, TAC and Quotas in the shallow banks fishery of Mauritius**Situation before application of management measures**

- The banks (St Brandon, Nazareth and Saya de Malha) were subjected to high fishing pressure, with cycles of high and low production over the last 20 years.
- Licensing system for vessels introduced in 1992 had no effect in reducing capitalization. The number of vessels had already increased from 5 in 1981 to 18 in 1992.
- MSY of the banks (4 500 t/yr) was exceeded for some years.

Management tools used

- A TAC (5 258 t) was worked out in 1994 and quotas were allocated to vessels proportionately according to their performance during 1993.
- No additional vessel were allowed to enter the fishery (Limited Entry).
- As from the 1995/96 fishing season, the quota system was modified. New quotas were calculated (4 752 t), using the fishing performance of the companies (past five years). The seven companies implicated could transfer the allocated quotas amongst themselves with the approval of the Ministry of Fisheries.
- No new vessels allowed unless as replacements for scrapped vessels.
- As TAC (4 752 t) was still too high, it was decided to reduce it by 5% during subsequent years until 2000 or until resource shows sign of recuperation (e.g. in 1996/97:4 514 t; 1998/99:4 073 t).
- Stakeholders consulted on the major steps involved.

Result/observation of trends up to 2000

- Analysis of catch per fisher per day from two banks showed a downward trend until 1997 when it started increasing again. A decreasing trend was observed for $L_{c_{50}}$ (length at first maturity) of the most exploited species through 1995, but rose gradually till 2000; indicating stock recovery through 2000.
- Only ten vessels and six companies remained in operation by 2000.
- Very few quota transfers took place.

Note: New modifications introduced in the quota allocations in 2000:

- Allocation to fishing companies based on performance during two previous years (instead of five) so as to avoid non performing companies to secure quotas and not using it at expense of others.
- A buffer stock of 350 t not allocated to any company and kept as a precautionary measure to meet requirement for additional quotas during the year.
- There was no reduction of five percent on the TAC as from year 2000 as companies were not able to exhaust quotas allocated and the stock situation was considered to have improved.

Results since 2000

- Catch per fisher day continued on its increasing trend (from 81 kg and 76 kg in 1998 to 93.3 kg and 83.3 kg in 2002 for the Nazareth bank and Saya De Malha bank respectively).
- No $L_{c_{50}}$ data were available for comparison.
- Only nine vessels were operational in 2002.

Note: There was no reduction of the TAC since 2000. Companies were again not able to exhaust all quotas allocated, basically on account of various operational difficulties (encountered with fishers and crew).

Lessons learnt:

This experience confirms/demonstrates that trends towards overfishing in an intensively fished fishery can be reversed by using combination of simple management tools such as TAC/Quota and Limited Entry of vessels. Stakeholder involvement in major decisions on how management tools are applied is important in the sustainability of the process.

TABLE 3
Fishing License Conditions

Country/ Entity	Years of Fishing Agreement	Gear type	Validity	Fees	Restrictions	Total Fees (2000)
EU	12/1999 to 12/2002	Tuna Seiners	one year	25€/kg advance payment of 1 750	(i) To fish beyond 12 nm from the baseline	35 500€
		Surface Longliners> 150 GRT	one year	25€/kg advance payment of 1 375	(ii) Line fishing not authorized in traditional grounds, viz. Soudan and East Soudan Bank	69 126€
		Surface Longliners< 150 GRT	one year	25€/kg advance payment of 1000		83 000€
		Line fishers	one year 3,6 or 12 months	80€/per GRT		95 859€
Japan		Longliners	one year	US\$3 000 for a minimum licence period of 90 days and US\$1 000 for any additional 30 days or part thereof	Not to fish (i) within 75 nm from the baseline of the islands of Mauritius and Rodrigues, (ii) within 12 nm from the baseline of any other islands	44 000 US\$
Seychelles	Agreement not finalized					

exploitation was reached in the two fisheries mentioned earlier, management tools in general contributed to stabilizing the stocks and improvement has been noted in at least one case.

The major impediment to improved management at national level is the lack of effective enforcement, especially regarding control of foreign fishing or IUU fishing in the EEZ. It is to be noted, however, that Mauritius is working within the framework of the Indian Ocean Commission (grouping most of the island states of the South West Indian Ocean) towards the setting up a regional Monitoring Control and Surveillance (MCS) system. Simultaneously, funds under the EU fishing agreement are also being utilized to set up a vessel monitoring system (VMS) which is planned to become operational in 2005. Furthermore, as a member of SADC, Mauritius also participates as an observer in activities related to the establishment of effective co-operation on MCS among the SADC Coastal Member States (Angola, Namibia, South Africa, Mozambique and Tanzania). Activities relate to information gathering; training, planning analysis; legal issues review and analysis, economic planning analysis; co-management review; national and regional workshops on the above; and initiation of national projects.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The work of the Ministry of Fisheries (i.e. administration, research, monitoring and control) is geared towards the management and development of fisheries and conservation of the marine living resources. Fisheries management does not figure as a specific item in the budget. The recurrent expenditure, comprising personal emoluments and other recurrent charges gives an indication of costs of managing fisheries in Mauritius. Thus about ten years ago (financial year 93/94) the cost was Rs 37.14 million as compared to Rs 96.345 million in the financial year 2002/2003 – an increase of 159 percent. In real terms there has been a gradual increase in the budget to meet increases in cost of living expenses and inflation; increases in staff numbers; and to cater for additional activities associated with management. All the services provided are covered from public funding with only minor inputs from other sources such as bilateral assistance in research programmes and consultancies.

Running costs of any service generally increase from year to year. There has been an increase in management activities over the years mainly associated with increased

stakeholders meetings, monitoring and enforcement activities related to coastal artisanal fishing, licensing and inspection at port of foreign fishing vessels and sampling programmes on vessels. The increase in development activities associated with tourism and other coastal developments including dredging works in the coastal zones and lagoon continue to trigger numerous meetings/consultations, protests and even law suits and financial claims on the part of fisher groups.

In the financial year 2002/2003, the revenue collected for fisheries was MR 25 217 414, of which licence fees from fishing vessels represented 87 percent. The rest were contributed by fees for import permits (12 percent) and sales of produce (0.85 percent).

The revenue in the financial years 93/94 was MR 1.9 million out of which license fees (MR 0.4 million) represented 21 percent. Therefore, over a span of a decade, revenue has increased twelve-fold with license fees alone increasing 55 times. Any revenue collected goes to the general government fund and is, therefore, not directly available for fisheries management activities. Revenue represented 26 percent of the running cost in 2002/2003.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Mauritius has ratified the United Nations Convention on the Law of the Sea (UNCLOS) and the United Nations Fish Stock Agreement (25 March 1997). It has recently deposited its instrument of acceptance of the FAO Compliance Agreement on 27 March 2004. Actions to implement some of the important provisions of these instruments in domestic fisheries are:

UNCLOS:

- *Article 61: determination of allowable catch in the EEZ*

There is a sustained effort on the part of the country to monitor catch and effort in all the fisheries exploited in its waters. This process is also complemented through a number of stock assessment projects carried out at the level of the research service of the Ministry of Fisheries. Maximum sustainable yields in some nearshore bank/demersal fisheries were estimated (Saunders *et al.*, 1988); however, allowable catch has been worked out for the banks fishery only. As regard the stock assessment and catch limits of the highly migratory pelagic (regional) resources, the country continues to work in the context of the IOTC.

- *Article 62: access to surplus allowable catch to other states*

As mentioned earlier, Mauritius is not in a position yet to exploit the pelagic resources fully. Access to the resources is being provided through licensing of foreign vessels and through fishing agreements with an intergovernmental organization (EC) a fishing association (Federation of Japan Tuna Cooperatives Association) and the Seychelles.

- *Article 63: States to agree upon the measures necessary for the conservation of stocks (straddling) occurring in overlapping EEZ and beyond, either directly or through RFMO*

Mauritius is participating in the setting up of the Southern Indian Ocean Fisheries Agreement which will address such issues.

- *Article 64: Highly Migratory stocks: obligation to cooperate with a view to ensure conservation and optimum utilization throughout the region*

As mentioned, Mauritius cooperates fully with IOTC.

UN Fish Stocks Agreement

Important provision of the Agreement	National Action/implementation
Application of precautionary approach	Relevant measures are implemented through licensing conditions under Articles 37, 38, 39 and 40 of the Fisheries and Marine Resources Act of 1998.
Application of ecosystem approach	Use of driftnet is not allowed in the EEZ. Concept needs to be developed.
Strengthening of the flag State's duties and enforcement responsibilities, including the adoption of vessel monitoring systems	No person can use a Mauritian vessel for fishing or related activity within the waters of Mauritius or continental shelf in any fishery on the high seas or within the fishing zone of a foreign state except under a licence from the Ministry of Fisheries. Among the conditions (both for vessel with Mauritian flag or foreign vessel under license from Mauritius) are mandatory reporting of positions and submission of fishing log books, vessel inspection at port, possibility of boarding and observers on board. Steps are being taken to implement a VMS in Mauritius. The country is also a party to the regional MCS which is being set up by the Indian Ocean Commission (IOC).
Implementation of port State's control	Prior notice together with a declaration of catch on board by any vessel is required when it enters the port. Once in port, a vessel is inspected (catch and log book etc. to verify whether there has not been any breach of license conditions or management measures in place by RFMOs. In case of toothfish fishing vessel, possession of a valid Dissosticus Catch Document and a VMS which is fully functional throughout the fishing campaign are required.
Participation in sub-regional or regional fisheries management organizations or arrangements competent to manage straddling fish stocks or highly migratory fish stocks	Mauritius is a member of the IOTC and party to the Convention of CCAMLR.
Participation in bilateral, regional, and subregional cooperation in enforcement?	Mauritius will participate in the regional MCS project to be implemented by the IOC.

FAO Compliance Agreement

Detailed information in respect of vessels entitled to fly the flag of Mauritius and authorized to fish on the high seas are submitted to FAO as per Article VI of the Agreement.

International Plans of Action

INTERNATIONAL PLAN OF ACTION (IPOA)	NATIONAL ACTION TAKEN
IPOA to prevent, deter, and eliminate illegal, unreported and unregulated fishing	(1) A system of vessel registration and record of vessel is in place. (2) Vessels fishing in the EEZ and the high seas are licensed. (3) An MCS system involving log book, reporting, and vessel inspection is being implemented. (4) Mauritius cooperates with the RFMO (IOTC and CCAMLR) in implementation of management measures related to IUU fishing. (5) An NPOA-IUU is being prepared by the Ministry of Fisheries (see also measure taken under UNFSA above).
IPOA for the conservation and management of sharks	There is no directed shark fishery in Mauritius. Sharks taken as by-catch in the swordfish fishery, longline tuna fishery, and other nearshore fisheries represent about one percent of the catch. However, an NPOA – shark is being elaborated.
IPOA for the management of fishing capacity	All vessels, boats, crafts, or rafts capable of fishing are registered. Any entry in a fishery requires a licence issued by the Ministry of fisheries. Limited entry is already used as a tool for fisheries management in the banks fishery and the artisanal fishery (large net and gillnets). No one can purchase a vessel for fishing purpose unless he obtains letter of intent from the Ministry of Fisheries.
IPOA for reducing the incidental catch of seabirds in longline fisheries	No action envisaged (no incidental catch of seabirds is reported in Mauritius).

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBs)

As a member of Indian Ocean Tuna Commission (IOTC), Mauritius participates in all its work and is bound to implement management measures, resolutions, and

decisions adopted by the Commission when applicable to members. The Commission may adopt, by a two third majority, on basis of scientific evidence, conservation and management measures to ensure the conservation of stocks covered by the agreement and to promote the objective of their optimum utilization throughout the convention area. At its last meeting in 2003, it was pointed out by the Scientific Committee that, with the exception of skipjack, most of the important fish stocks (yellowfin, bigeye and swordfish) are being fished above or near their MSYs (IOTC 2004). However, the Commission has not so far adopted any measure pertaining to spatial, temporal, gear, size, catch, or access restrictions. The terms of reference are being worked out to commission a report on management options for tuna and tuna like resources in the Indian Ocean. Meanwhile, in line with FAO Compliance Agreement and the IPOA-management of fishing capacity, a binding resolution on limitation of fishing capacity of Contracting and Cooperating Non-Contracting Parties was adopted, taking into consideration interest of small developing states like Mauritius with legitimate aspiration to enter the fishery.

Decisions/resolutions/recommendations of the Commission are implemented by the Ministry of Fisheries after the implication of any new measure or regulation arising out of the commission's decision has been studied fully.

Mauritius contributes to the tuna stock assessment programme of the IOTC. Tuna fisheries are monitored through acquisition of fishing data (samplings) obtained from licensed vessels which call at Port-Louis for transshipment. Species compositions, length distributions, reproductive indices (gonad index, sex ratio, maturity, etc.) and spatial distribution of tuna catches from licensed longliners and purse seiners are worked out and transmitted to IOTC.

Mauritius is participating in intergovernmental consultations with the view to setting up of fisheries commissions to cover fisheries falling under national jurisdictions in the South West Indian Ocean (SWIO) and fisheries (non-tuna resources) falling in the high seas in the SWIO. The last consultation meeting held in the Seychelles (13-16 July 2004) unanimously adopted the draft resolution and statutes for the establishment of the Commission for the Management and Development of the Coastal Fisheries of the SWIO. The statutes have been approved by the FAO Council in November, 2004.

In the context of SADC, Mauritius has signed a Fisheries Protocol in 2001 which aims, amongst others, at the promotion of responsible use of living aquatic resources of SADC member states, ensuring food security and human health, safeguarding of the livelihood system of fishing communities and generating benefits from renewable resources. The implementation of the Protocol is basically national. Policies and strategies adopted locally are in line with the Fisheries Protocol. As regard regional cooperation in fisheries in SADC, a few projects are being implemented which are funded from outside sources such as the EU and FAO notably concerning MCS (mentioned earlier in section V) and harmonization of fisheries legislation on which a regional workshop (funded by FAO under TCP/RAF/8933) was held in 2001.

Mauritius has also become party to the Convention for the Conservation of the Antarctic Marine Living Resources (CCAMLR) since October 2004 and cooperates with it in its effort to deter and eliminate IUU fishing in the convention area of CCAMLR.

Information on catch/transshipment and calling vessels are provided to CCAMLR. Mauritius also participates in joint inspection of toothfish fishing vessels calling in Port-Louis with the flag state inspectors in the verification of catch document and vessel monitoring system (VMS) prior to authorization of transshipment or landing of the catch. Since February 2003, it is mandatory that every Patagonian toothfish fishing vessel calling in Port-Louis for transshipment should be equipped with a VMS that should be functional throughout the fishing campaign.

SUMMARY AND CONCLUSIONS

Of the twelve fisheries which are exploited at various levels of intensity, ten of them are under some form of management regime. Of the managed fisheries, there are published regulations for only two of them and only one is covered by a management plan. The rest of the managed fisheries are controlled through licensing with attached conditions. Management measures will need to be elaborated urgently for the two recreational fisheries in view of their potential to create conflicts with existing artisanal fisheries.

Management tools utilized to control fisheries are gradually evolving and licensing is increasingly utilized. High levels of exploitation have been reached in two fisheries, the lagoon artisanal fishery and the banks fishery, and the management tools put into place in these fisheries have contributed to stabilizing the stocks and even help stock recovery in the latter fishery. In the former case, although management regime does not seem to have improved the stock situation, it is most likely that they have prevented further deterioration. A precautionary approach in the management of other fisheries needs to be pursued.

Though the Fisheries and Marine Resources Act of 1998 does not set up a series of steps or process to be followed for elaboration of fisheries management regulations or plans or for resolution of conflicts among stakeholders, its framework allows the setting up of basic processes for management of fisheries such as consultation, collection of data and elaboration of conservation measures (including setting of quotas and licensing) and regulations. The Act allows for the fulfillment of some important provisions contained in international conventions/agreement, such as the authorization to fish in international waters and in waters of another state. Mauritius has taken some positive actions toward fulfilling important provisions of the IPOA-IUU, though no national plan has been produced yet.

Fisheries management costs are borne by the government. Such costs increase year by year basically on account of increasing conflicts between operators in fisheries and those in coastal development and on account of the increasing need for consultations, monitoring (including collection of data on fisheries) and enforcement, human resources and logistics. The Fisheries legislation does allow for revenue collection through licensing of fishing vessels; however, the revenue goes to the general government fund and, therefore, is not directly available for fisheries management activities.

The contribution of fisheries to GDP (without taking into consideration the considerable contribution of fishing related activities in port services and fish processing) is low although a positive balance of trade has been achieved. Limited potential exists for further development of marine capture fisheries except for the offshore migratory species such as tuna and tuna like species. Therefore, the objectives of fisheries management and development should be geared towards sustainable use of existing fisheries and the protection of the marine environment that is of prime importance to a growing industry like tourism. At the same time the social dimension where artisanal fishers are key players should be given due consideration. Concerning the tuna fisheries, the objective of managing this resource should be to provide the necessary incentives for increased Mauritian participation while continuing to maximize economic returns in a regional context under the management regime of the IOTC.

Some factors which may contribute to a more effective management of fisheries are:

- Amendment of the Fisheries and Marine Resources Act to define fisheries management and its objectives and to explicitly introduce the concept of sustainable use, precautionary and participatory approaches and other principles as elaborated in the Code of Conduct for Responsible Fisheries;
- Promulgation of regulations and elaboration of management plans (with clearly stated objectives) where appropriate for each fishery with participation of stakeholders;
- Improvement of resource assessments including enlargement to cover recreational/sport fisheries;

- Implementation of fisheries information management system to integrate data from resources exploited by different categories of vessels. This system should also integrate licensing and other relevant data;
- Implementation of a vessel monitoring system (VMS) for increased control over licensed vessels as part of a regional and international monitoring, control, and surveillance (MCS) network;
- Involvement of fishing community representatives in co-management consultation processes, where practical, and timely dissemination of information to stakeholders;
- Establishment of more formal cooperative arrangements between the Fisheries Protection Service (FPS) and the National Coast Guard (NCG) for enforcement of fisheries legislations; and
- Elaboration of a socially acceptable policy for limiting number of fishers in the heavily exploited artisanal fisheries and for controlling recreational fishing exploiting the same fisheries.

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Current Management of Marine Capture Fisheries in Mauritius

* In other cases of managed fisheries where no regulations have been published, licenses with conditions/rules are issued to participants under the Fisheries Act.

** Only one fishery is concerned.

Category of Fishery	Fishery	Volume tons	Value* USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan? (Yes/No)	# of Participants	# of Vessels
Industrial	Shallow banks	3 286	7 365 172	58.4	48.7	Yes ***	6 Companies (500 fishers)	10
	Demersal	2 113	7 286 206	37.6	48.2	No	1 Company (90 fishers)	2
	Tuna	219	453 103	3.9	3.0	No	3 Companies (66 fishers)	3
Artisanal	Artisanal (Mauritius)	1 302	5 387 586	40.7	52.0	No	2 028 fishers	1 260
	Artisanal (Rodrigues)	1 404	3 873 103	43.9	37.4	No	1 867 fishers	801
	Inshore (St Brandon)	491	1 100 517	15.7	10.6	No	40 fishers	12
Recreational	Sports (off lagoon)	400	827 586	57.1	40.0	No	500 fishers	52
	Recreational (lagoon)	300	1 241 379	42.9	60.0	No	23 400 fishers	1 000
		-	-	-	-	-	-	-

*** Managed through licensing and quotas.

[illegible]

Costs and Funding Sources of Fisheries Management within the three largest fisheries in Mauritius

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Shallow banks	Yes	Yes	Yes	No	No	No
	Demersal	Yes	Yes	Yes	No	No	No
	Tuna	Yes	Yes	Yes	No	No	No
Artisanal	Artisanal (Mauritius)	Yes	Yes	Yes	No	No	No
	Artisanal (Rodrigues)	Yes	Yes	Yes	No	No	No
	Inshore (St Brandon)	Yes	Yes	Yes	No	No	No
Recreational	Sports (off lagoon)	Yes	Yes	Yes	No	No	No
	Recreational (lagoon)	Yes	Yes	Yes	No	No	No
-	-	-	-	-	-	-	-

Compliance and Enforcement within the three largest fisheries in Mauritius

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Shallow banks	No	Yes*	Yes	Yes	No	
	Demersal	No	No	Yes	Yes	No	
	Tuna	No	Yes*	Yes	Yes	No	
Artisanal	Artisanal (Mauritius)	No	No	No	Yes	No	
	Artisanal (Rodrigues)	No	No	No	Yes	No	
	Inshore (St Brandon)	No	No	No	Yes	No	
Recreational	Sports (off lagoon)	No	No	No	Yes	No	
	Recreational (lagoon)	No	No	No	Yes	No	
-	-	-	-	-	-	-	

* May be required to take observers on board but there is no formal observer programme.

Country review: Mozambique

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INTRODUCTION

Mozambique is one of the world's poorest countries, with 70 percent of the population living below the poverty line; about 80 percent of the 16 million people live in rural areas. Many areas are lightly populated, while two of the ten provinces - Nampula and Zambézia - contain 40 percent of the population. The country occupies 800 000 km² of the south-east coast of Africa; sharing boundaries with South Africa, Swaziland, Zimbabwe, Malawi, and Tanzania.

Mozambique's coastline measures approximately 2 770 km and is characterized by a wide diversity of habitats, including sandy beaches, coral reefs, estuary systems, bays, mangroves, and seagrass beds. The Mozambique Channel separates Mozambique from the island of Madagascar, which is 400 km wide at its narrowest point. Madagascar shields Mozambique from the open ocean, except in the extreme south and north where the coast is directly exposed to the Indian Ocean. The continental shelf averages 15 to 25 km in width, however it can be as narrow as 100 m (off Pemba in northern Mozambique) and 145 km (Sofala bank) (Sousa *et al.*, 1997). The distribution and abundance of the living aquatic resources, as well as the fishing methods used to exploit them, are largely dependent on the physical characteristics of the coast.

The fisheries sector in Mozambique is an important source of animal protein and employment. Total marine products are estimated at between 100 000 to 120 000 tonnes per year and consumption is estimated at 7.5 kg per capita. The fisheries industries provide direct employment for around 90 000 people, excluding those involved in trading and processing.

POLICY FRAMEWORK

The fisheries legislation in Mozambique is characterized by three different periods:

- *Prior to 1975: Colonial Period.*
 - The first fisheries legislation in Mozambique (1965) related to the shallow water shrimp fishery.
 - In 1971, the Fisheries Maritime Legislation was first adopted and subsequently revised in 1974.
- *From 1975 to 1990: Period of civil war in Mozambique.*
 - During this period, little legislation was adopted regarding fisheries management.
- *1990- 2004: Current period*
 - In 1990, the Fisheries Act was first adopted as *Act n° 3/90*. This law established the framework of fishing activities.
 - Also in 1990, the government of Mozambique approved the general regulation of fisheries law, which filled some gaps in the Fisheries Law, namely with regard to licensing and enforcing.
 - In 1996, the General Regulation of Maritime Fisheries was created and cancelled the previous revised regulation of 1971 (revised 1974). This regulation defined the typologies of fisheries by species, vessel size, and other specifications related

to fisheries. It also specified size and season of authorized marine species and fishing requirements for the various fisheries.

- The current Marine Fisheries Regulation (REPMAR) was adopted in December, 2003 and is based upon modern management concepts and established the use of co-management in fisheries management, the obligatory use of devices to protect endangered species (TEDs) and to reduce the bycatch, and, for first time, the possibility to create artificial reefs (Castiano, 2004).
- During this period, a series of regulations were created namely: aquaculture, sport fishing, and many punctual resolutions to solve problems in fisheries management.

Generally, fisheries laws and maritime fisheries regulations are made at national level. Small resolutions could be for one regional area for example - Sofala Bank or Maputo bay. At the local level, there is no formal legislation. The principles of management at the local level are based upon traditional use of resources, such as the closed season for beach seines in Inhassoro. This principle is not legally adopted but is locally implemented through co-management initiatives.

LEGAL FRAMEWORK

The Fisheries sector is administered by the Ministry of Fisheries (MoF), created by the Government following general elections in 2000. Prior to this, Fisheries and Agriculture were housed under a single ministry.

The structure of the Ministry comprises three National Directorates, namely:

- National Directorate of Fisheries Administration (DNAP)
- National Directorate of Fisheries Economy (DNEP)
- National Directorate of Human Resources

At the same time the Ministry comprises four Central Departments, namely:

- Department of Fish Quality Control
- Department of Aquaculture
- Department of Finances
- Department of International Cooperation

The DNAP is the institution responsible for granting licenses and inspection of fishing activities. In addition, the DNAP must ensure that fisheries resource management measures are effectively enforced as well as the effective operation and management of fisheries-related public equipment and infrastructure.

The DNEP is mandated to undertake studies relating to national policies, lead the planning and budget process for the fisheries sector, and control implementation. This Directorate is also responsible for collecting statistics on the fisheries sector in Mozambique.

At the provincial level, Provincial Directorates of Fisheries represent the fisheries sectors. There are four provincial fisheries representations (Maputo, Inhambane, Sofala and Zambézia) answering directly to Provincial Government; while in other the Provincial Services of Fisheries falls under the Ministry of Agriculture.¹

There are three fisheries-related institutions: the National Fisheries Research Institute (IIP), the National Institute for the Development of Small- Scale Fisheries (IDPPE), and the Fisheries School.

The IIP provides advice to the Ministry regarding the state of stocks and their exploration. The IIP operates as a classical fisheries research institute with its focus on biological and environmental aspects of management. Their structure comprises central departments and seven provincial delegations in Beira, Quelimane, Inhambane, Quelimane, Angoche, Songo and Metangula. Two delegations are in lake Nyassa

¹ Partly for historical reasons and partly because the MoF is relatively new in the country.

and Cabora bassa dam (Metangula and Songo). The IDPPE focus is on research and extension in small-scale fisheries.

The Maritime Administration, subordinate to the Ministry of Transport and Communication, is legally responsible for navigation and safety at sea. In addition, in some areas, the responsibility for artisanal fisheries licensing has been delegated to the Maritime Administration, mainly due to lack of human and financial resources.

National parks in Mozambique recently have begun to play a role in fisheries management. There are two marine parks, Bazaruto and Quirimbas, and the Ministry of Tourism is responsible for managing such national parks.

It is important to note that the relationship between the MoF and the Marine Administration is relatively good, but that there is a lack of coordination between the fisheries sector and tourism, mainly due to interesting conflicts involving these sectors.

STATUS OF THE FISHERIES

The fisheries sector in Mozambique is characterized by its economic diversity. Mozambique has three main types of fisheries: industrial fisheries, semi-industrial, and artisanal.

The industrial fisheries comprise 186 vessels, 90 of which are used in the tuna fisheries (DNAP, 2004) and are dominated by State joint-venture companies. The major products include shallow- and deep-water shrimp, lobster, fish and some tuna, most of which are for export markets. The principal importers of Mozambique fisheries products are Japan, EU and South Africa. The industrial fleets are principally based in the central and northern ports of Beira and Quelimane.

The semi-industrial fisheries comprise 97 vessels under 20 km in length (DNAP, 2004) whose ownership is more national. The semi-industrial fisheries vessels are mostly ice carriers, making short trips and not venturing far from the shore due to the characteristics of the vessels (i.e. limited capacity to store and process fish products). The main products are shallow water shrimp and demersal fish. Basically, shrimp is processed ashore (frozen); whereas, demersal fish are usually sold fresh on ice. The main ports are Beira and Maputo. Target markets include national markets and regional export markets, principally South Africa.

The total annual production of the industrial and semi-industrial sectors was estimated at 19 524 tonnes in 2003 (MIP, 2004); noting that shallow water shrimp contributed 39 percent of the total value of industrial fisheries. Other important products were tuna (38 percent), deep shrimp (seven percent) and fish (five percent) (Table 1) (MIP, 2004). As control on the tuna fisheries is limited, the Government considers the shallow-water shrimp, deep-water shrimp, and fish the most important resources captured in industrial fisheries.

The artisanal sector is widespread along the length of the coastline. The artisanal fleet number is estimated in 15 269 (IDPPE, 2004). These vessels provide employment for around 58 000 fishers plus a further 1 468 fishers without vessels operating from the shoreline (IDPPE, 2004). Artisanal fisheries are confined to near coastal areas and use a large diversity of fishing gear including beach seines, handlines, gillnets, traps, spears, and manual extraction.

The main products are fish and prawn, but in certain areas, it is possible to find high captures levels of crab, lobster, bivalves, sea cucumber, sea shells, squid, and sharks. Informal traders dominate the trade of these products. Processing is usually smoking or sun drying but a small portion is sold fresh, mainly in cities or villages. Prices vary considerably by site, and they may increase two to three times in the urban markets.

Until more recently, the total annual catch for the entire coastline was estimated based on less robust methods and the official catch values for this subsector were under-estimated, mainly due to the high dispersion of fishing monitoring centers

TABLE 1
Industrial and semi-industrial fisheries in Mozambique

	2001		2002		2003	
	Quantities (tonnes)	Value (US\$ 000)	Quantities (tonnes)	Value (US\$ 000)	Quantities (tonnes)	Value (US\$ 000)
Shallow shrimp	9 162	73 296	9 000	72 000	7 690	61 520
Tuna*	3 096	95 166	3 000	94 125	7 450	87 121
Bycatch** (fish)	1 080	540	1 450	725	1 608	804 0
Deep shrimp	1 738	8 690	1 500	7 500	1 425	7 125
Fish	1 230	3 075	550	1 375	1 075	2 688
Squids and octopus	76	190	60	150	131	328
Langoustine	69	690	80	800	124	1 240
Crab	47	141	40	120	81	243
Lobster	4	44	5	55	0	0
Other	19	9.5				
Total					19 584	159 936

* Tuna is not national production; the fishers are paying royalties taxes.

** Bycatch in general is fish from shallow and deep shrimp trawler.

Sources: Relatório do balanço geral de actividades- Conselho coordenador, 2004; MIP, 2004.

TABLE 2
Artisanal fisheries catches in 2003

Fishery	Quantity (tonnes)
Beach seine	48 886
Gillnet	9 761
Handline	8 447
Total	67 074

Note: results are based on a probability-based survey in 19 percent of total fishing centers.

Source: Santana-Afonso *et al.*, 2004.

along the coast, lack of human and financial resources, and a lack of a clear definition of responsibilities inside the fishing sector in Mozambique. Based on a rule of thumb, some authors estimated artisanal catches at 80 000 tonnes per year, with a related value of over US\$ 50 million. Recently the IIP developed a new method based on probability-based survey techniques for estimating catch and effort of artisanal fisheries (Volstad *et al.*, 2004, Baloi *et al.*, 2004)). With this methodology and a cost-effective sample size of 19 percent, the annual production in 2003 for three main fisheries namely beach seine, gillnet and handline was estimated at 67 070 tonnes (Santana-Afonso, P. *et al.*, 2004) (Table 2).

Sports line-fishing, mainly by South African fishermen from beaches or ski boats, has increased remarkably since 1992. The Southern part of the country (Ponta de Outro To Inhassoro) is the most affected. There is little or no control over this type of activity and there are many reported cases of Southern African “sports” fishermen exporting large quantities of line and reef fish to South Africa (Massinga and Hatton, 1996).

MANAGEMENT ACTIVITY

The industrial and semi-industrial fisheries are managed on the basis of annual quotas, allocated among license holders. The quotas are set annually by the MoF on the basis of consultations with IIP and these quotas are then allocated by the DNAP. In the artisanal fisheries, management extends to the requirement of annual licenses; however, as the artisanal fisheries are operated generally without management, landings data from this sector are incomplete, and there is not enough control in this sector; some authors have considered the artisanal fisheries as “open-access” fisheries. As a result, most of the resources found in bays close to urban areas are heavily exploited.

At the central level, the Fisheries Management Commission (CAP), with representatives from all three sub-sectors as well as fisheries institutions, meets periodically to discuss management issues and serves as a limited forum for conflict resolution. Another forum, but more at the local level, is a series of local co-management

TABLE 3
Status of Industrial and Semi-industrial Fisheries in Mozambique

Fisheries	Sector	Status
Shallow water shrimp: Sofala Bank	Industrial	Fully utilized
Shallow water Shrimp: Maputo bay	Semi-industrial	Stable
Deep water shrimp	Industrial	Under fishing
Lobster	Industrial	Economically not viable
		Depleted???
Fish: South of Mozambique	Industrial and semi-industrial	Fully utilized
Fish: North of Mozambique	Industrial	Under fishing
Tuna	Industrial	Data not available

committees; set up primarily through the initiative of the IDPPE but nowadays through community initiatives. These co-management committees are completely integrated into the formal fisheries management process and have appropriate regulations.

The principal and strongest fisheries management scheme is within the shallow-water shrimp fisheries, where various management measures have been put into place including closed seasons, fishing effort limitations (number of vessels), catch quotas, and mesh size regulations. However, although quotas and licensing are consistent, monitoring and enforcement are still major problems (Massinga and Hatton, 1996).

Officially, more than 75 percent of all fisheries in the country are management, but in practice, only a small proportion has effective management. The main causes of less effective management are related with limited resources (human and financial) and the extensive Mozambique coastline. An example of the effect of ineffective management is the common use of small mesh sizes in beach seines within the artisanal fisheries (which are not allowed and not fiscalized), with un-targeted captures (all size classes and virtually every variety of fish).

In some ways, it is impossible to say exactly the amount of resources are effectively managed because Mozambique has the necessary legal instruments but may not have the ability to implement and enforce them in all fisheries. In areas where the sector is well represented, it is possible to say that the enforcement is made in more than 50 percent of the fisheries, but in remote areas effective enforcement is less than ten percent. However, it is clearly visible that the number of resources, fisheries and areas managed during the last ten years has increased significantly. On the one hand because of political stabilization and on the other hand due to the creation of a stand-alone ministry responsible for the fisheries sector in Mozambique.

Rigorous and regular stock assessments and annual total allowable catch (TAC) estimates are produced for the shallow water shrimp fishery. Estimates for other fisheries are based on historical information and through less rigorous methods. In general, industrial fisheries are regularly assessed but artisanal fisheries are not. Table 3 presents an overview of the status of industrial and semi-industrial fisheries in Mozambique.

For artisanal fisheries, the Master Plan of Fisheries of 1995 states that many resources are over-exploited, including sea cucumber, rock lobster, and fish in bays and estuaries. However, this statement was not substantiated in the text.

At one point, a dramatic step to close the shallow-water shrimp fisheries (industrial) was taken and supported by a series of regulations to manage the fisheries. However, these regulations were not totally effective because:

- The number of boats did not increase but the number of fishing hours increased;
- The number of boats did not increase but the efficiency of boats increased; and
- The sector did not have a full monitoring of the introduced regulations.

To summarize, the main impediments to more effective management in Mozambique are:

- Insufficient human and financial resources;

- Lack of priorities of the sector;
- Short-term economic priorities instead of rational use of the resources; and
- Great dispersion of fishing centers for artisanal fisheries.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Fisheries management costs in Mozambique have increased over time. Although actual costs estimates are not available, Table 4 presents some evidence that the costs and budget have increased.

TABLE 4
Significant changes in Mozambique Fisheries since 1990

	1990	2004
Fisheries ministry	No	Yes
Number of fisheries provincial directorate	0	4
Number of IIP Delegations	1	7
Number of artisanal monitoring fishing centers	2	19
Number of co-management experiences	0	More than 20
Number of fisheries closed	0	1
Fisheries law	no	yes
Sport fishing regulations	no	yes

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Mozambique is implementing the following measures to control illegal and uncontrolled fishing:

- Implementation of a national program of monitoring and control of fishing activities (MCS), in some cases with South Africa collaboration;
- Nation-wide implementation (2004) of a vessel monitoring system (VMS);
- Established of co-management regimes for artisanal fisheries as way to manage this activity;
- Legislations regarding the use of TEDs in industrial trawlers to prevent the accidental capture of endangered species like turtles;
- Mozambique's intention to sign the UN Fish Stocks Agreement and to implement other FAO initiatives;
- Some projects and initiatives under the Jakarta mandate (reef fish swapping aggregation);
- Mozambique is not member of the Indian Ocean Tuna Commission (IOTC); and
- Regional projects (with some SADC countries) to identify fisheries types and an assessment of their overall role and status.

PARTICIPATION IN REGIONAL FISHERY BODIES

Mozambique is participating in some regional fisheries body to promote the sustainable use of fishing resources as, for example:

- Large Marine Ecosystems (LME);
- Southwest Indian Ocean Fishery Commission (SWIOFC);
- South Indian Ocean Fishing Agreement (SIOFA);
- Regional initiatives (SADC), in Systems of information (on fisheries);
- Project for Development and Management of Fisheries in the Southwest Indian Ocean (SWIOP).

At the moment, no legal mechanism exists to implement internationally adopted measures.

SUMMARY AND CONCLUSIONS

Mozambique is characterized by a high diversity of fisheries according to economic and social importance. Economically the shallow-water shrimp fishery is the most

important fishery in the country, but socially the artisanal fisheries sub-sector is the most important source of food and employment for local communities.

The national administrative system for fisheries is new and during the past four years, the government has made progress in establishing infrastructure and has allocated human resources along the country. However, additional efforts are to be made, for example, in the coordination with other institutions that contribute to fisheries management in the country; namely with the Ministry of Tourism, responsible in part for fisheries management and enforcement.

The fisheries management is strongest in the industrial fisheries sector with laws and methods properly established to manage and monitor the fisheries. In the artisanal and recreational fisheries, management regimes are less developed, but the Government of Mozambique is trying to correct the situation, mainly in the artisanal fisheries, through monitoring, management, and development programmes.

Few fisheries are considered in danger in Mozambique. With regard to the shrimp fisheries, the carrying capacity of the fishery was reached, but no fishing effort reduction strategy was implemented. However, efforts are being made to remedy this situation.

In terms of regulations, Mozambique has an appropriate system but does not have enough enforcement and capacity to control this regulation. Although the country has in its fisheries Plan of Action (1996) implemented some global initiatives such as VSM, MCS, and TEDs, implementation capacity remains questionable, principally in terms of specialized human resources.

Mozambique is active in regional fishery bodies in the region, but is not a member of IOTC; even in spite of the importance of its tuna resources. Other international and regional initiatives are still being put into place it is too early to evaluate their progress.

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APPENDIX TABLES

Current management of marine capture fisheries in Mozambique

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	> 67	< 33	< 33	increasing
Regional	< 33	< 33	< 33	decreasing
Local	< 33	< 33	< 33	increasing

Summary information for three largest fisheries (by volume) in Mozambique (2003)

Category of Fishery	Fishery	Volume million tonnes	Value* million US\$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan? (Yes/No)	# of Participants	# of Vessels
Industrial	Shrimp Swallow water	7 690	61.5	n.a.	n.a.	Yes	49	77
	Deep shrimp (Gamba)	1 425	7.1	n.a.	n.a.	No	30	25
	Line fish (fish)	1 075	2.7	n.a.	n.a.	No	27	27
Artisanal	Beach seine	n.a.	n.a.	n.a.	n.a.	No	4 287	n.a.
	Gillnet	n.a.	n.a.	n.a.	n.a.	No	4 017	n.a.
	Line fishing	n.a.	n.a.	n.a.	n.a.	No	5 555	n.a.
Recreational	Sport fishing	n.a.	n.a.	n.a.	n.a.	Yes	n.a.	n.a.

n.a. = not available

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

Use of fishery management tools within the three largest fisheries in Mozambique

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Shrimp Swallow water	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
	Deep shrimp (Gamba)	No	No	Yes	Yes	Yes	Yes	No	No	No
	Line fish (fish)	No	No	Yes	Yes	Yes	Yes	No	No	No
Artisanal	Beach seine	Yes	Yes	Yes	Yes	Yes	No	No	No	No
	Gillnet	Yes	Yes	Yes	Yes	Yes	No	No	No	No
	Line fishing	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Recreational	Sport fishing	Yes	No	No	No	Yes	Yes	No	No	No

Costs and funding sources of fisheries management within the three largest fisheries in Mozambique

Category of Fishery	Fishery	Do Management R&D	Funding Monitoring & Enforcement	Outlays Cover Daily Management	Are Management License fees in fishery	Funding Sources From License fees from other fisheries	Resource rents
Industrial	Shrimp Swallow water	No	No	No	Yes	No	Yes
	Deep shrimp (Gamba)	No	No	No	Yes	No	Yes
	Line fish (fish)	No	No	No	Yes	No	Yes
Artisanal	Beach seine	Yes	Yes	Yes	Yes	Yes	No
	Gillnet	Yes	Yes	Yes	Yes	Yes	No
	Line fishing	Yes	Yes	Yes	Yes	Yes	No
Recreational	Sport fishing	No	No	No	Yes	Yes	No

Compliance and enforcement within the three largest fisheries in Mozambique

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Shrimp Swallow water	Yes	Yes	Yes	Yes	Yes	
	Deep shrimp (Gamba)	Yes	Yes	Yes	Yes	Yes	
	Line fish (fish)	Yes	Yes	Yes	Yes	Yes	
Artisanal	Beach seine	No	No	Yes	No	No	
	Gillnet	No	No	Yes	No	No	
	Line fishing	No	No	Yes	No	No	
Recreational	Sport fishing	No	No	Yes	No	No	

Capacity management within the three largest fisheries in Mozambique

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Shrimp Swallow water	Yes	No	decreasing	Yes	closure of fishery
	Deep shrimp (Gamba)	No	No	constant	No	
	Line fish (fish)	No	No	constant	No	
Artisanal	Beach seine	No	No	decreasing	No	
	Gillnet	No	No	constant	No	
	Line fishing	No	No	constant	No	
Recreational	Sport fishing	No	No	unknown	No	

Country review: Seychelles

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INTRODUCTION

Marine capture fisheries management in the Republic of Seychelles has progressed considerably over the last two decades in tandem with the development of industrial tuna fisheries in the western Indian Ocean (WIO). Seychelles now serves as the regional hub for industrial tuna fisheries in the region and hosts the secretariat of the Indian Ocean Tuna Commission (IOTC). Although industrial fisheries constitute a major pillar of the economy, artisanal fisheries remain of great importance in terms of food security, employment, and cultural identity in Seychelles. Revenue and capacity building generated by growth of the industrial fisheries has afforded significant investment in the development and management of artisanal fisheries, and the two sub-sectors now compliment each other effectively. The rapid and parallel development of large and small-scale fisheries in Seychelles provides an informative case study for a review of marine capture fisheries management.

The Republic of Seychelles is an archipelago comprising 115 islands scattered over an exclusive economic zone (EEZ) covering 1.3 million km² of the WIO. A population of 82 000 largely resides on Mahe, Praslin and La Digue, the three main granitic islands of a submerged mid-oceanic shelf called the Mahe Plateau. The remaining atolls, granitic and coralline islands are sparsely inhabited and most fisheries, and their management, are centralized. It is estimated that fisheries and ancillary services account for around 15 percent of total formal employment, with the tuna canning factory and a tiger prawn farm constituting the largest single employers (SFA, 2004). Typical of small-island developing states, there is a high reliance on marine resources, with Seychelles noted as having one of the highest per capita fish consumption rates in the world (FAO, 2005).

Seychelles is characterized by a wide range of marine habitats, including shallow water fringing reefs, granitic reefs, bank and plateau shelves and drop-offs, atolls, lagoons, seamounts and pelagic habitats (Jennings et al., 1999). The fisheries sector comprises the industrial, semi-industrial and artisanal fisheries sub-sectors. Purse seine and longline fisheries for tuna and tuna-like species constitute the industrial fisheries sub-sector and, in the last decade, Seychelles has developed a semi-industrial sub-sector comprising a longline fishery for swordfish and tuna (Wendling and Lucas, 2003). Artisanal fisheries have developed to exploit a high diversity of species and habitats, leading to a wide array of boat-gear combinations and strategies (Wakeford, 2000). For the purpose of this review, we base our assessment on the main artisanal fisheries that are largely distinct in terms of target species and/or gears and form logical management units. Of the 8 artisanal fisheries discussed, the semi-pelagic handline fishery, the demersal handline/dropline fisheries and the small boat trap fisheries landed the greatest weight of fish in 2003, a pattern that is usually stable across years (Azemia and Robinson, 2004).

POLICY FRAMEWORK

In the late 1970s and early 1980s, fishery policy statements of the Seychelles Government were contained within the National Development Plan and/or the Public

Sector Investment Programme. The first stand-alone fisheries policy document was prepared in 1986. In 2002, a revision of the policy took account of the changing nature of national fisheries. The new policy incorporated fisheries development and placed a greater emphasis on conservation aims and issues of sustainability. Policies were harmonized to promote resource sustainability. In 2005, the Ministry of Environment of Natural Resources (MENR) established a Fisheries Policy Unit (FPU) within the Ministry, in recognition of the need for Government to be more proactive and adaptive in such a dynamic sector. The FPU works in collaboration with the technical institution, the Seychelles Fishing Authority (SFA), on policy issues.

The main objectives (elements) of the revised fisheries policy are:

- Promotion of conservation and sustainable management of marine resources in order to ensure the long-term viability of the industry.
 - The achievement of this objective determines the direction of research, development, and management, the content of fisheries agreements and the structure of the sector.
- Generation of the maximum amount of work opportunities.
 - Any initiative taken within this objective also has the requirement of long-term financial viability and sustainability, and appropriate training to provide good career opportunities within the sector.
- Maximisation of revenues from fisheries and fisheries related activities.
 - In the policy, revenues are defined in part as foreign exchange earnings, with emphasis placed on product quality, value addition, and food safety issues.
- Promotion of an integrated economy.
 - Focuses on identifying linkages and integration between sectors and the needs for development of ancillary services to fisheries.
- Enhancement of food supply and security.
 - This mainly concerns the need to develop the artisanal fisheries sub-sector and to conserve resources through appropriate management strategies.
- Promotion of safety at sea.
 - This objective serves to encourage a culture of safety at sea, appropriate training and investment in the latest communication and safety equipment.
- Maintaining Port Victoria as the major tuna landing/transshipment port in the WIO.
 - Emphasis is on providing better services and facilities that are regionally competitive for the foreign and local fleets.

LEGAL FRAMEWORK

The principal legal instruments in Seychelles established the national fishing authority and provided control of fishing through the Licensing Acts (1986) and Regulations (1987), and subsequent amendments. The Seychelles Fishing Authority (SFA) was established by an act in 1984 and given the mandate to:

- Promote, organize and develop fishing, fishing industries and fishing resources in Seychelles;
- Assist in the formulation of the national policy with respect to fishing, fishing industries and fishing resources and in the implementation of that policy;
- Conduct negotiations, or engage in meetings, seminars or discussions, with regard to fishing or fisheries or the establishment or operation of fishing industries, whether at a national or international level, on behalf of the Republic or otherwise;
- Identify the manpower training requirements of Seychelles with regard to fishing and fishing industries;
- Those mentioned in any other written law.

The Fisheries Act (1986) allows for management plans implemented through Regulations. The Act requires SFA to collect and analyze statistical and other information on fisheries and to prepare and keep under review plans for the development and management of fisheries. In preparing management plans, SFA, as far as possible, must consult with fishers and other relevant stakeholders, and, where practical, with regional fisheries institutions. The Act gives the Minister power to appoint enforcement officers to ensure compliance with management measures stated in the Act and Regulations. Breach of management measures is an offence under the Act and legal action ranges from fines to forfeit of vessel and gears.

Other relevant legislation includes the Maritime Zones Act (1999) which, *inter alia*, sets out the different limits of Seychelles maritime zones, the territorial sea, archipelagic waters, contiguous zone as well as the exclusive economic zone and the continental shelf. The Environment Protection Act (1994) serves to ensure that all development and activities, including fisheries, are subject to environmental controls. The National Parks and Nature Reserves Act (1969) provided the legal instrument to establish and manage marine protected areas for fisheries, conservation, as well as other purposes.

STATUS OF FISHERIES IN SEYCHELLES

The fisheries sector recently surpassed tourism as the principal source of foreign exchange. The inflow generated by fisheries related activities amounted to 46.7 percent of the total earnings in 2003 (SFA, 2004). When fish processing (mainly the tuna cannery), stevedoring, harbour fees and provisioning and related activities are included, the fisheries sector contributes between 15 and 20 percent of national GDP. The major part of this contribution is from the industrial fisheries sub-sector.

Industrial fisheries

Industrial fisheries are entirely executed by foreign owned vessels licensed to fish in the Seychelles EEZ. There are two principal fisheries, namely the purse seine fishery (fleets mainly comprise EU, French and Spanish vessels) and the longline fishery (fleets mainly comprise Japanese, Taiwanese and South Korean vessels). Purse seining began in 1983 when French and Spanish fleets moved from the tropical Atlantic to the WIO. Purse seiners licensed to fish in Seychelles waters increased from 30 in 1984 to 55 in 2000. Recently, around 51 vessels have been operating in and around the EEZ on an annual basis. Industrial longline fishing activities began in the early 1950s. The number of licenses issued to longliners has increased steadily during the last 15-years, and now ranges from 165 to 241 vessels per annum.

Purse seiners mainly target surface swimming tunas like skipjack (*Katsuwonus pelamis*), small yellowfin (*Thunnus albacares*) and juvenile bigeye (*Thunnus obesus*). Longliners, in contrast, target large, deep swimming, bigeye and yellowfin tuna. The purse seine catch has remained fairly stable for the last 10-years, with around 98 000 tonnes of tuna caught in 2003. Skipjack has always been the predominant species, comprising 55 to 60 percent of the catch, except in 2003 when yellowfin tuna catches exceeded those of skipjack for the first time (SFA, 2004). The annual catch reported by licensed longliners in 2003 was 8 500 tonnes.

Semi-industrial fisheries

The semi-industrial longline fishery targets swordfish (*Xiphias gladius*), tuna and tuna-like species mostly within the Seychelles EEZ. This fishery started in 1994 as a strategy to relieve pressure on inshore demersal stocks by developing local capacity to fish for pelagic resources in deep waters off the plateau. There are 12 local vessels in the fishery ranging from 12 to 22 m (LOA) in size. Swordfish is the main target species, accounting for 60 percent of the catch, together with yellowfin (15 percent), bigeye tuna (10 percent) and several other species including shark. Annual catches range

between 250 and 400 tonnes (SFA, 2004). Catches have dropped considerably since 2003 due to export difficulties (see below).

Artisanal fisheries

The total artisanal catch has remained fairly stable since 1985 with landings typically ranging between 4 000 and 5 000 tonnes per year. Of the main fisheries, the semi-pelagic handline fishery is the most important in terms of weight landed, contributing over 44 percent (1710 tonnes) to the total artisanal catch (3852 tonnes) in 2003. The value of this fishery was estimated at US\$ 1.9 million in 2003. Most catches in this fishery are taken by inboard powered vessels ('whalers') that largely operate on the Mahe Plateau, although catches of semi-pelagic species by smaller outboard powered vessels are variable and may also be significant. The principal species are *Carangoides* spp., *Caranx* spp., *Sphyraena* spp., *Euthynnus affinis* and larger tuna species. Whaler vessels often switch fishing mode and target demersal species. Around 90 vessels have operated annually in this fishery over the last decade. The fishery is of major importance for food security, supplying a significant proportion of the country's protein requirement at affordable prices (Mees et al. 1998).

The demersal handline/dropline fisheries are of secondary importance in weight caught. A large number of species are targeted, predominately snappers, groupers and emperors, of which *Lutjanus sebae*, *L. bohar*, *Aprion virescens*, *Epinephelus chlorostigma* and *Lethrinus nebulosus* are usually the most important by weight. The main fishing grounds are the offshore banks and drop-offs of the Mahe Plateau, which are fished by fully decked inboard vessels ('schooners'). Inshore areas are also fished by small boats with outboards and whalers. A total of 1313 tonnes was landed in 2003, representing 34 percent of the total artisanal catch, valued at around US\$ 2.7 million. Most of the catch is sold and consumed locally, and meets most demand from the tourism industry, although a small percentage (< 5 percent) may be exported (Azemia and Robinson, 2004). Fleet sizes for the demersal line fisheries are difficult to quantify as many of the small boats may switch to different fisheries. However, the schooner fleet is generally homogenous in gear and fishing method and the fleet consisted of 36 vessels in 2004.

The trap fishery is largely limited to inshore areas around the main granitic islands. It is mostly a small outboard boat or 'pirogue' (large canoe) fishery, although larger vessels (whalers and schooners) occasionally set traps as well. Traps are constructed of bamboo in a typical 'arrowhead' design. They are usually deployed on or near coral and granite reefs, mainly for *Siganus* spp., *Lethrinus* spp. and *Epinephelus* spp. A total of 427 tonnes¹ were landed in 2003, valued at around US\$ 1.2 million. Of similar relative importance are the small boat net fisheries, with mackerel (*Rastrelliger* spp.) as the principal target species. Catches are highly variable and seasonal. A total of 221 tonnes² were landed in 2003 and 32 active nets were licensed (Azemia and Robinson, 2004).

Several invertebrate fisheries are important to the artisanal fisheries sub-sector, including spiny lobster, crab, octopus and sea cucumber fisheries. Most are minor in terms of catch weight but one in particular constitutes a valuable export-driven fishery. Landings of sea cucumber have increased steadily during the past decade and 137,681 pieces were taken in 2003, mainly of five species (*Holothuria nobilis*, *H. fuscogilva*, *Thelenota ananas*, *Actinopyga mauritiana* and an unidentified teatfish). Exports to SE Asian countries, notably China (Hong Kong), Singapore and Malaysia, amounted to 37.9 tonnes (approximately US\$ 340 000) (Payet, 2005). The spiny lobster fishery was last opened for the November 2002 to January 2003 fishing season, with an estimated

¹ Mixed line and trap catches excluded from total.

² Only mackerel species are included in total.

5.4 tonnes landed. Due to the fact that the fishery is seasonal and has often been closed over the last 15-years, lobsters have to be imported to supply demand from the tourism market. The spanner crab (*Ranina ranina*) fishery consists of two licensed vessels that caught 17 tonnes in 2003 fishing hoop-tangle nets. The fishery is under-exploited due to limited demand. Octopus is caught by skin divers or foot fishers using harpoons and the fishery consists of commercial and subsistence elements. A total of 27 tonnes of octopus was landed in 2003 (Azemia and Robinson, 2004).

MANAGEMENT ACTIVITY

SFA is responsible for the management of all fisheries in Seychelles waters. Management of fisheries and related measures has increased over the last decade. Several fisheries were closed either because of concerns as to their economic viability or for sustainability and conservation reasons (e.g. shark gillnetting). Fisheries management has been strongly influenced by external market forces, particularly as a result of increased demand from Asian markets, i.e. sea cucumber and shark fin. Increasing entry and effort prompted concern in the sea cucumber fishery and the adoption of precautionary measures while preparing for a more comprehensive and scientific approach. A live reef fish food trade fishery in 1998 and 1999 was closely monitored by SFA and eventually closed because of the vulnerability of the target species and low economic viability. Regulations prohibiting wild caught live fish fisheries have now been adopted. A mothership-dory fishery for demersal species in the early 1990s terminated in 1993 following market constraints and localized resource depletion. A management plan exists for this fishery.

Seychelles also has an extensive marine protected area (MPA) network which contributes as closed areas and reserves. Six marine national parks are under the responsibility and management of the Seychelles Center for Marine Research Technology-Marine Parks Authority (SCMRT-MPA). SFA manages 4 shell reserves and 3 Special Nature Reserves are managed by NGOs.

Industrial fisheries

Seychelles has various regulatory mechanisms for the management of industrial fisheries. Foreign fishing vessels must be licensed to fish in the EEZ and can only target tuna and tuna-like species. Licensing can be through agreements negotiated with third countries, economic entities or with fishing entities. Licenses can also be issued directly to foreign fishing vessels whose flag State does not have a fishing agreement with Seychelles.

All foreign fishing vessels in excess of 24 m are required to be on the positive list of IOTC and be capable of responding to a satellite Vessel Monitoring System (VMS). In addition, foreign fishing vessels are required to keep up to date logbook records of fishing activities inside the Seychelles EEZ and to report their entry and exit from the Seychelles EEZ. To avoid conflict with local fisheries, nine zones are restricted to foreign fishing. SFA inspects all licensed foreign fishing vessels calling into Port Victoria and collects their catch and effort log sheets. Vessels that do not call into Port Victoria must submit their catch and effort log sheets at the end of their fishing trip.

The Indian Ocean Tuna Commission (IOTC) is mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. Seychelles is an active member of IOTC, hosts the secretariat and co-chairs annual meetings of the Commission. As a member, Seychelles provides the IOTC secretariat with a list of all foreign fishing vessels in excess of 24 m authorized to fish in the Seychelles EEZ. Fisheries statistics are submitted annually based on requirements specified under Resolution 98/01 (mandatory statistical requirement for IOTC members). These include specifications of all vessels registered in Seychelles, catch and effort statistics reported in the Seychelles EEZ and length frequency data. These data are used in stocks assessments carried out during the various annual working group parties. Seychelles also actively

participates in annual Scientific Committee meetings and endeavours to implement Committee recommendations. The Seychelles also chairs meetings of the Compliance Committee.

Seychelles has developed an NPOA IUU. All Seychelles flagged vessels require authorization to fish outside the Seychelles EEZ and are required to report through VMS. Authorizations are also required for transshipments at sea and are required to submit copies of licenses for access to waters of third countries.

According to recent stock assessments, the current levels of annual catches of bigeye are considered to be close to or possibly above, MSY. In recent years, the Commission has considered limiting the amount of fishing effort for bigeye tuna. If this measure is adopted, coastal States will most likely be required to limit the number of licenses issued to foreign fishing vessels. Catches of yellowfin are also approaching levels that warrant a cautionary approach. Concerns over the status of stocks of albacore tuna and swordfish also exist as evidence suggests that current catch levels are unlikely to be sustainable in the long-term. It is recognized that there is a need to control and/or reduce effort in the albacore and swordfish fisheries. For the short-lived and highly productive skipjack tuna, levels of exploitation are below MSY.

Semi-industrial fisheries

Vessels engaged in the longline fishery require a local fishing vessel license. Relative to the foreign fishing licenses, the license fees for local longliners are extremely low. Requirements include completion of catch and effort log sheets, catches must be landed in Port Victoria, and a separate authorization is required to fish outside the Seychelles EEZ. All longliners are currently monitored by VMS, on a voluntary basis, through the SFA Fisheries Monitoring Centre (FMC). SFA is developing a plan to better regulate the activities of local longline vessels through routine port inspections.

Management and performance of the longline fishery have been subjected to severe constraints since 2003, following a nationally imposed ban on swordfish exports resulting from EU concerns over cadmium levels. This situation immediately resulted in a huge drop in catches. In an effort to remain viable, many semi-industrial longline vessels diversified their activities by targeting sharks for their fins. In early 2005, an EU revision of the acceptable level of cadmium in swordfish, from 0.05 parts per million (ppm) to 0.3 ppm, led to a resumption of targeting of swordfish and tuna. Unfortunately, the intensive fishing of sharks during the ban resulted in heightened conservation and management concerns for this vulnerable group. Concerns over the status of sharks are being addressed through the development of a National Plan of Action (NPOA), which is in the final stages of preparation. The Government is developing policy regarding the management of the shark fisheries that, amongst other issues, addresses the issue of shark finning. As a first step, legal measures have been proposed to ban shark finning on all foreign fishing vessels licensed to fish in the EEZ.

Artisanal fisheries

The main artisanal fisheries are managed and an inshore fisheries management strategy, prepared in 1998 (Mees et al., 1998), continues to guide management and research activities. The regulatory measure most widely employed is vessel licensing. A local fishing vessel license is required to engage in commercial fishing, at a cost of approximately US\$ 24. A number of fisheries/gear types are prohibited in Seychelles, including demersal trawl fisheries, gillnetting for sharks, drift net fisheries and fisheries using explosives, poisons, and spear-guns.

Since 1985, the major artisanal fisheries have been monitored by a stratified catch, effort and species composition sampling system (Catch Assessment Survey, CAS). The CAS is stratified geographically and by boat and gear type. The system is composed of four boat-type surveys plus data collection from marketing companies. The four

surveys are the small boat survey, the whaler handline survey, the schooner survey and the sport fishery survey, the latter based on logbooks. Trends in catch per unit effort (CPUE) and other fisheries parameters are reported annually (Azemia and Robinson, 2004). Dedicated monitoring systems are applied to the sea cucumber and lobster fisheries. Stock assessments of a few key indicator species (e.g. *Lutjanus sebae*, *Aprion virescens*, *Epinephelus chlorostigma*) are carried out periodically. Recent assessments are lacking for lobsters and many important trap fishery species, and no assessments have been conducted on target species of the semi-pelagic handline fishery, or on mackerel and sharks. A lack of human capacity is often prohibitive to regular stock assessment.

Entry to the semi-pelagic handline fishery and the demersal handline/dropline fisheries is not currently limited and there are no regulations regarding gear, minimum size or output. Despite periodic declines in catches of the main target species (e.g. *Carangoides* spp., *Sphyræna* spp.), which may correspond to ocean-climate anomalies, the semi-pelagic handline fishery is considered stable. In terms of the demersal handline fishery, declines in CPUE for important groups, such as groupers and emperors, point to an increasingly over-exploited resource base in near-shore areas (Grandcourt and Cesar, 2003). Fleet over-capacity is as a major contributory factor, with around 250 vessels in the small boat fleet all operating within 10 nautical miles of the inner granitic islands. In recent years, many schooners have predominately targeted *Lutjanus sebae* on the Mahe Plateau and demersal catches from more remote banks and atolls have declined. Moreover, whaler vessels are increasingly targeting demersal rather than semi-pelagic species. Stocks of *Lutjanus sebae* are fully exploited and there is a need for management measures to reduce the risk of over-exploitation.

Regulatory measures in the small boat trap fishery include vessel licensing and a minimum mesh size restriction (40 mm). SFA conducts regular patrols of the coastal waters to monitor compliance with mesh size restrictions and has undertaken educational programmes to sensitize trap makers on the importance of the measure. Non-compliance normally results in seizure and destruction of traps. Fisheries data for the trap fisheries is collected through the CAS small boat survey. Catch rates for the main target species (*Siganus sutor*) fluctuate between years but appear stable on longer time scales. A local fishing vessel license and a fishing net license are required for entry to the small boat net fisheries. Fishing net licenses are issued annually and cost approximately US\$ 20. All nets must be marked with a license number and it is an offence for anyone to interfere with the tag.

The spiny lobster fishing season falls between November and January but the fishery has been closed since the end of the 2002/2003 season due to indications of resource depletion, with CPUE declining from 15 kg/trip over the 2001/2002 season to 11.5 kg/trip over the 2002/2003 season (Isidore and Payet, 2003). When open, several regulatory measures are applied to the fishery including limited entry, a comparatively large license fee (c. US\$ 95), minimum size restrictions (75 mm carapace length) and a ban on harvesting berried females. A monitoring and surveillance programme is implemented during any open season to collect fisheries, biological and compliance data. Despite sensitization programmes and pressure on buyers (mostly restaurants), illegal fishing for lobsters is a major problem.

Several artisanal fisheries are not subject to any regulatory measures, or are poorly managed. The octopus fishery is not managed and the relative importance of the recreational fisheries is unknown. Despite efforts to collect fisheries data from the sport fishery through a logbook system, compliance has been low and there are few indicators regarding the status of the fishery.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The costs of marine resources management have largely been borne by the Government. As a parastatal organization and the executive arm of the Government for most

BOX 1

A participatory approach to the management of the sea cucumber fishery

In terms of catch sizes, the sea cucumber fishery in Seychelles is small compared to most other artisanal fisheries but it constitutes a valuable export driven fishery. The fishery has undergone rapid development over the last eight years due to increased demand for bêche-de-mer on international markets. Taking into account the experiences from other countries, where sea cucumber fisheries have collapsed due to overfishing and lack of regulation, this trend heightened concerns regarding the sustainability of the fishery.

Since 1999, SFA has adopted a precautionary approach with regards to this fishery, introducing a licensing system for both fishers and processing. A quota of 25 fishing licenses was introduced, pending the results of stock assessments. Conditions within the licenses limit the number of divers to 4 and makes reporting catch and effort compulsory. In late 2003, SFA instigated a sea cucumber stock assessment and management project. A major objective was to develop a participatory approach to management of the fishery. Although stakeholders have been informed and consulted as part of decision-making processes in the past, fisheries management in Seychelles has ultimately been characterized by a top-down approach. However, fishing organizations and institutions have developed in recent years and are increasingly active in fisheries issues and management.

The stock assessment took place in 2003 and 2004 and estimates of current biomass and TAC have been derived. Results have been disseminated to stakeholders and socio-economic surveys conducted. Management options have been discussed with stakeholders, their views incorporated and a management plan developed. Management will be steered by a management committee comprising representatives of the main stakeholder groups, including boat-owners, divers, processors and exporters of sea cucumbers.

This process marks the first time that a fishery management plan has fully incorporated a participatory approach. It is hoped that this development will serve as a model for greater stakeholder participation in the management of other fisheries (Payet, 2005).

TABLE 1
Recurrent SFA annual budgets for the period 2000 to 2003

Year	2000	2001	2002	2003
Budget (US \$'000)	1 400	1 366	1 572	1 700

fisheries activities, SFA receives state revenue budgets. Annual budgets have risen since 2000 to meet the increasing need for investment in fisheries management, research, development, and training (Table 1).

In 2003, the SFA budget constituted 0.7 percent of the total national budget. In addition to recurrent budget, SFA also receives funds under the Seychelles/EU fishing agreement for projects (FMC), and grants for specific research and management activities may also contribute to management costs. Fisheries management costs are supported by the Seychelles Coastguard, which has the mandate for maritime surveillance and safeguarding of marine resources in the EEZ.

There are several different sources of state revenues from fishing and related activities, including the manufacturing sector (tuna cannery), exports, and also revenue from industrial tuna fishery vessels (transshipment fees etc.). In terms of resource rent, licensing of foreign fishing vessels to fish in the Seychelles EEZ is by far the major source of revenue. In 2003, the Government accrued US\$ 7.884 million from

TABLE 2
International legal instruments to which Seychelles is a signatory

Short Title	Long Title
Straddling/Highly Migratory Fish Stocks Agreement	Conservation and management of straddling fish stocks and highly migratory fish stocks
Nairobi Convention	Convention for the protection, management, and development of the marine and coastal environment of the eastern African region
CBD	Convention on biological diversity
COMESA	Common market for Eastern and Southern Africa
CITES	Convention on international trade in endangered species of wild fauna and flora
Basel Convention	Convention on the control of transboundary movements of hazardous wastes and their disposal
IMO Convention	Convention on the international maritime organization
London Dumping Convention	Convention on the prevention of marine pollution by dumping of wastes and other matter
Cotonou I	Fifth ACP - EEC Convention
SOLAS	Safety of life at sea
IOTC	Indian Ocean tuna commission
MARPOL 73/78	International convention for the prevention of pollution from ships
OPRC	International convention on oil pollution preparedness, response and cooperation
MP	Montreal protocol for the protection of the ozone layer
UNCLOS	United Nations Convention on the law of the sea
UNFCCC	United Nations framework convention on climate change
Compliance Agreement	United Nations compliance agreement

foreign vessels engaged in fishing, which includes financial compensation from the EU (US\$ 1.31 million) and licenses fees paid by purse seiners and longliners. Revenue is also accrued by Government through fines for breach of fisheries legislation and local fishery license fees. In 2003, local fishery license fees totaled US\$ 8 570, a value that is typical of most years. The recurrent SFA budget for 2003 constituted 21.5 percent of resource rent revenue. Given that fisheries is the most important sector in terms of foreign exchange earnings and that fisheries revenue is essential for the support of other sectors, this relatively large reinvestment underlines Government commitment to fisheries management and other related activities.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Seychelles has signed or ratified a number of international conventions and also abides to the various voluntary codes of the FAO. These relate to both the domestic and industrial fisheries. International and regional obligations are becoming increasingly important with issues such as illegal, unreported and unregulated (IUU) fishing, incidental catch of seabirds on longlines, management of sharks and fishing capacity becoming global concerns.

Seychelles ratified the United Nations Convention on the Law of the Sea (UNCLOS) in 1991. The FAO Compliance Agreement was ratified in 1994 and the UN Fish Stocks Agreement (UNFSA) in 1998. Numerous amendments have been made to the Fisheries Act (1986) and Regulations to provide the legal framework for Seychelles to discharge its responsibilities under the Convention and agreements. Under the Convention, Seychelles is defined as a coastal State, a port State and a flag State. In terms of coastal State responsibilities, various studies have been conducted in Seychelles to determine MSY for most economically important species of finfish. With regards to the highly migratory tuna stocks, rights of exploitation are allocated to distant water fishing nations through licensing arrangements. As a port State, Seychelles does not allow its ports to be used by fishing vessels that are known to be engaged in IUU fishing. As a flag State, Seychelles only registers vessels that target tuna and tuna-like species in the Indian Ocean. These obligations will be actioned through the NPOA IUU. Seychelles is also a party to other Conventions relevant to fisheries management (Table 2).

Seychelles is implementing the Code of Conduct for Responsible Fisheries in a step-wise manner that is largely dictated by human and financial constraints.

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBS)

Seychelles is a member of IOTC and several Regional Economic Organizations (e.g. COMESA, COI) that address fisheries issues. Seychelles attaches much importance is attached to tuna fisheries in the WIO as shown through its commitment to hosting IOTC. All relevant resolutions of the Commission are being implemented, including the provision of catch and effort statistics, specifications of vessels registered in Seychelles that are authorized to operate in the IOTC Convention Area, and participation in research initiatives. Seychelles also cooperates with the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

Seychelles is also a member of the South West Indian Ocean Fisheries Commission (SWIOFC), an advisory FAO body with a mandate to promote the sustainable development and utilization of (non-tuna) fishery resources in coastal waters of the region. The Commission is responsible for promoting sound fisheries management and enhancing regional cooperation on fisheries policies. Seychelles is also actively participating in negotiations for the establishment of the Southern Indian Ocean Fisheries Agreement (SIOFA). The Agreement focuses on regional cooperation on high seas fishing of non-tuna and tuna-like resources. The objectives of SIOFA are to ensure the long-term conservation and sustainable use of the fishery resources in the Southern Indian Ocean through enhanced cooperation between the Contracting Parties. The Agreement will also place much emphasis on the needs of developing States and small-island developing States bordering the area covered by the Agreement.

Seychelles is currently assessing its affiliation to all international organizations on a cost benefit basis.

SUMMARY AND CONCLUSIONS

Capture fisheries in Seychelles have developed substantially over the last 20 years, particularly industrial fisheries, and the sector is now of paramount importance to the country. Fisheries policy and legislation have been revised and strengthened to cope with national and international responsibilities for sustainable and equitable development and conservation of marine resources. Most fisheries are now actively managed with a broad range of regulatory measures mostly centred on vessel licensing. However, it is only in the industrial fisheries that effort controls are applied through license limitation. With the exception of a few high value invertebrate fisheries, most artisanal fisheries remain open access and excess fishing effort, especially in inshore areas, has led to localized over-exploitation. Government efforts to redistribute effort to the lightly exploited offshore grounds have not met with much success (Wakeford, 2000) and there is a need to reassess the management regimes for most artisanal fisheries.

Seychelles fisheries are increasingly vulnerable to rapid change as a result of external factors (e.g. sea cucumber markets, the shark finning and conservation, cadmium levels and seafood consumption as a health issue), and management activity must become more responsive and adaptable. Management plans under development for high value species may serve as a model for other artisanal fisheries, particularly in increasing the role of stakeholders in the management process. Although not currently utilized, there is good potential for rights-based approaches to management, particularly for inshore trap fisheries (Mees et al., 1998). The use of ecosystem-based approaches to fisheries management is a possible tool to rehabilitate exploited populations. For example, several measures, including closed areas, are being evaluated for the protection of reef fish spawning aggregations (Robinson et al., 2004). In addition to development

of new management regimes, enforcement, monitoring and assessment need to be strengthened.

With the economy so firmly based on marine resources, Government, fishery managers and stakeholders will need to be increasingly proactive and decisive as the upper limits to resource exploitation are approached, in order to ensure long-term sustainability and reverse localized over-exploitation where this occurs.

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Country review: South Africa (Indian Ocean)

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Capricorn Fisheries Monitoring c.c.

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INTRODUCTION

As a case study in Marine Capture Fisheries Management, South Africa is unique in two senses – fisheries overlap in both the Indian and Atlantic Oceans and, recent (since 1994) political transformation has initiated dramatic changes in the management of these fisheries in nearly all respects.

South Africa's coastline extends from the southern tip of the African West Coast bordering Namibia in the north to the southern most point of Cape Agulhas at 350S and 200E. Thereafter the coastline extends north and eastwards into Kwazulu Natal where it borders Mozambique at 270S and 330E. On the West Coast, the northward-flowing Benguela Current system drives a typical cold water, upwelling, high productivity region with large industrial fisheries and low species diversity. On the East Coast the opposite is true, with the warm Mozambique and narrow continental shelf with a mixture of tropical and temperate water species. There is a transition zone on the southern coastline between these two systems that includes the temperate Agulhas Current which sweeps across a broad bank (the Agulhas Bank) on the continental shelf and mixes with the Benguela Current. At this intersection, eddies are formed that either move northwards into the Atlantic Ocean, or, retroflect south and east again into the Southern Ocean. By definition however, the true divide between the Indian and Atlantic Oceans, occurs at 200E. Significant commercial fisheries in South Africa off the Indian Ocean coastline are few and it is only the extension of the West Coast fisheries across the divide between the two Oceans that gives substance to the Indian Ocean fisheries complex. This report therefore focuses on the main fisheries in the Indian Ocean, which occur at the southern and western limits of the Indian Ocean. From a regional management perspective the political borders include Kwazulu Natal (Mozambique border southwards) to about 300E, then the Eastern and Southern Cape to Cape Agulhas.

Of the South African Indian Ocean fisheries, only the small Kwazulu Natal prawn-trawl fishery operating out of the port of Durban, is truly Indian Ocean in character. Numerous subsistence fisheries exist off the Natal coastline bordering the Indian Ocean, but these are relatively minor. A more substantial commercial line fishery¹ operates off the East Coast, but is also minor in comparison to the commercial line and recreational line-fish fisheries on the Eastern and Southern Cape Coasts. The main target fisheries in these areas include a squid-jig fishery, a commercial and recreational linefish fishery, and also extensions of the West Coast hake and sole bottom-trawl and purse seine fisheries for small pelagics.

POLICY FRAMEWORK

The guiding principles for fisheries in South Africa are embraced in the *Marine Living Resources Act (18) of 1998* (MLRA). This is a comprehensive Act of parliament

¹ Linefish refers to a large species complex of fish caught by handline or rod and line directly from the coastline or from small open-deck boats.

outlining policy relating to all living marine resources in South Africa and includes non-consumptive activities such as Boat-Based Whale Watching (BBWW) and shark cage diving. Management and control of marine resources are the mandate of the Minister of Environmental Affairs and is controlled by National Government². Provincial control is minimal and the only reference in the Act to provincial or regional management states that “the Minister may assign the administration of any provision of this Act to the executive authority of a province”³ and may also delegate his powers to sub-ordinates. He may not however delegate his powers to make regulations to the provinces and as such maintains National control of marine resources.

The stated purpose of the Act is “to provide for the conservation of the marine ecosystem, the long term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith”. The principles and objectives of the Act are stated as:

- the need to achieve optimum utilisation and ecologically sustainable development of marine living resources;
- the need to conserve marine living resources for both present and future generations;
- the need to apply precautionary approaches in respect of the management and development of marine living resources;
- the need to utilise marine living resources to achieve economic growth, human resource development, capacity building within fisheries and mariculture branches, employment creation and a sound ecological balance consistent with the development objectives of the national government;
- the need to protect the ecosystem as a whole, including species which are not targeted for exploitation;
- the need to preserve marine biodiversity;
- the need to minimise marine pollution;
- the need to achieve to the extent practicable a broad and accountable participation in the decision-making processes provided for in this Act;
- any relevant obligation of the national government or the Republic in terms of any international agreement or applicable rule of international law; and
- the need to restructure the fishing industry to address historical imbalances and to achieve equity within all branches of the fishing industry.

The MLRA and the associated “Regulations in terms of the MLRA, 1998” were made law in 1998 after an extensive Fisheries Policy development process initiated after democratic elections in 1994. The MLRA replaced the old Sea Fisheries Act that had become outdated with democratic change. The new legislation and policy emphasises the need to transform the fishing industry and to develop opportunities for historically disadvantaged citizens of South Africa. The new Act also had a revised approach to the International commitments of South Africa with respect to (UNCLOS) and Regional Fisheries Management Organisations, including specific reference to high seas fishing and the obligations of South Africa in that regard.

LEGAL FRAMEWORK

The legal framework for the control and management of all marine resources in South Africa falls under the MLRA, regulations and specific permit conditions. Management

² The Act vests complete control with the Minister with respect to marine resources.

³ South Africa is divided into provinces, of which there are four coastal provinces in which marine utilization occurs, these are: Northern Cape (Atlantic coastline), Western Cape (Atlantic and Indian Oceans), Eastern Cape (Indian Ocean) and Kwazulu-Natal (Indian Ocean).

of commercial and recreational fisheries, whether Indian Ocean or Atlantic, therefore falls within this framework although on a sector by sector basis specific management regimes may differ.

The Minister of Environment Affairs and Tourism (DEAT) is the ultimate authority responsible for fisheries and marine resources. Management of fisheries is delegated to the Deputy Director General of a Branch of DEAT – Marine and Coastal Management (MCM) in Cape Town (which is the hub of the commercial fisheries). Within MCM, four Directorates handle Finance, Research, Resource Management (with sub-directorates, regulation, allocation and verification) and Compliance (monitoring and enforcement). For legal matters, MCM and all directorates fall under a single national judicial structure with provincial magisterial districts and courts. At a regional level therefore, offences under the MLRA are normally prosecuted in the nearest district court. South Africa has also instituted “environmental courts” established in specific areas where environmental matters have a high profile (such as on the Western Cape coast where poaching of abalone is rife). Historically, prosecution of minor offences under the MLRA has been protracted and had a high probability of failure for mostly minor technical reasons. The new environmental courts utilize magistrates and prosecutors who specialize in environmental offences, increasing both the chances of successful prosecution and reducing delays in the process.

On a higher level, more complex cases (such as fishing rights-based litigation) are referred to the high courts (provincial based), or to the appeal court based in South Africa’s judicial capital, Bloemfontein. Litigation may also be referred to the Constitutional Court⁴.

Although DEAT and MCM are the ultimate bodies responsible for fisheries, provincial institutions do exist that augment the management and prosecution of fisheries legislation. For example, on the Indian Ocean coastline, the Kwazulu Natal Parks Board have been delegated the responsibility of managing national parks in the region, including marine and terrestrial reserves. Their officials and inspectors monitor vessel landings and collect catch and effort data and also have a compliance function (i.e. can make arrests and prosecute in terms of the MLRA). Nationally the South African National Parks authority also have similar powers and work closely with DEAT with particular regard to the coastal zone and marine reserves.

Non-fisheries specific legislation does not have a significant influence on the management of fisheries in South Africa. Most non-consumptive marine activities fall under the MLRA. The coastal zone is however more complex with developments affecting the coastline requiring environmental impact assessments (EIA) – at this point there is however no significant impact on fisheries known. Offshore hydrocarbon and diamond mining activity does interact and impact on fishing and coastal zones. In these cases, legislation requires EIA’s and a proper consultative process. A recent development is the introduction of the Biodiversity Act that establishes legislation requiring the preservation of biodiversity in South Africa – for example the establishment of new coastal and marine protected areas (MPA)⁵.

STATUS OF FISHERIES IN THE COUNTRY

The fisheries sector is a relatively small sector within the national economy of South Africa. In 1999 the whole South African Fishing Industry was estimated to generate approximately ZAR 1.7 billion (approximately US\$ 227 million) wholesale revenue per annum to South Africa’s Gross Domestic Product (this has increased to ~R2 billion in

⁴ The Minister of DEAT was recently challenged with respect to the allocation of rights in the hake trawl fishery.

⁵ South Africa committed to establishing 20 percent of all marine areas as reserves by 2010 at the most recent World Conference on Sustainability held in Durban in 2003.

2004). The overall contribution to the national GDP is less than 1 percent. Industrial fisheries in South Africa started just before the turn of this century and, thereafter, effort escalated rapidly. By the 1960s, catches in several South African fisheries had exceeded sustainable yields and there were sharp declines in some key stocks, prompting initiatives to improve the scientific standard and base for management of the major fisheries. For the purposes of this report it must be noted that the largest commercial fisheries in South Africa occur in both the Atlantic and Indian Oceans although the Atlantic sector is more productive.

The demersal trawl fishery targeting hake *Merluccius* sp. is the most valuable with 90 percent of the 161 000 tonnes TAC exported. The hake sector is quite complex in that it supports several fisheries of which the Offshore Trawl is the largest (about 33.3 percent of the stock caught in the Indian Ocean), a small Inshore Trawl fishery on the South Coast (in the Indian Ocean – about 6 percent of the hake TAC) and dedicated hake handline and longline fishery (about 10 percent of the hake TAC).

There is a small midwater trawl fishery operating on the South Coast (Indian Ocean) that targets exclusively adult horse mackerel *Trachurus trachurus capensis*, which in terms of volume (30–58 000 tonnes) is the third largest fishery in South Africa (but one of the lowest in terms of value). The purse seine fishery for small pelagic species (anchovy, pilchard, round herring, and juvenile horse mackerel) is South Africa's largest fishery in terms of volume with the 2004 TAC (combined for anchovy and pilchard) approximating 600 000 tonnes. The bulk of this catch is however taken in the Atlantic Ocean, with directed fishing for adult pilchard on the South Coast a recent development (since 2000).

There is a valuable inshore rock lobster fishery based in the Western Cape (non Indian Ocean) and a small capital-intensive fishery for deepwater rock lobster on the south coast (Indian Ocean), with a TAC based on tail weight approximating 450 tonnes.

An Indian Ocean-based squid-jigging fishery targets chokka squid. Catch varies considerably being as high as 14 000 tonnes in one year and 4 000 tonnes in the next. Presently the fishery is input controlled (men per boat) with about 145 boats and 2 324 fishers. Today the jig-fishing fleet consists of about 300 mostly small vessels, such as skiboats and catamarans, but effort is creeping up and catch rates are declining. The resource is protected by a closed season of 3–5 weeks when spawning is at its peak (usually November).

Other fisheries include a declining abalone fishery (Atlantic) which has been heavily poached (TAC < 200 tonnes now) and a complex linefish fishery extending around the entire coast that includes pole fishing for albacore tuna (4–6 000 tonnes per year). Catches in the commercial line fishery peaked at 18 000–20 000 tonnes in the late 1960s and early 1970s, but then declined steadily to an estimated 7 300 tonnes in 1985. Presently this sector has been dramatically reduced with most stocks overexploited, with many fishers now integrated into the hake handline fishery centred on Mossel Bay.

A small shark-directed longline fishery has operated in both Ocean sectors for many years (22 rights holders). More significantly an experimental tuna/swordfish longline fishery with up to 30 vessels has also been active since the mid 1990s. In 2004 this sector will be formalized permitting 30 tuna and 20 swordfish-directed boats to operate. A significant amount of this effort is expected in the Indian Ocean with boats using Durban and Richards Bay as a base.

MANAGEMENT ACTIVITY

South African fisheries have generally been well managed with frequent revision of management procedures reflecting progressive change within the country's management structures as well as changes in international trends. Management of the country's fisheries is the responsibility of the Department of Environmental Affairs and Tourism:

TABLE 1
Three largest Indian Ocean fisheries of South Africa

Fishery	Target Species	Allowable Catch (2004)	% Indian Ocean	Comment
Demersal Trawl	Hake	161 000 t	33.3%	33.3% of the hake TAC is caught on the South Coast (Indian Ocean) and includes the Inshore Trawl fishery. Other sectors catching hake include a longline and handline fishery.
Small pelagics (purse seine)	Anchovy and Pilchard	250 000 t Anchovy 350 000 t Pilchard	Anchovy 100% Atlantic Pilchard ~ 20% Indian	Anchovy fishery is West Coast (Atlantic) based. Pilchard is fished predominantly on the West Coast but has expanded into the Indian Ocean as far as Port Elizabeth – 20% is an approximation only.
Midwater Trawl	Horse Mackerel (Adult)	30 – 58 000 t (this is a precautionary catch limit)	100 %	Fishery targets adult stock in the Indian Ocean. Juvenile stock caught by the purse seine fishery.

Note: these fisheries occur in the Atlantic as well.

Branch – *Marine and Coastal Management* (MCM) in Cape Town. Management structures within MCM have in recent years changed with political transition, but essentially apply the following protocol:

- An appointed scientific working group for each fisher sector meets regularly to discuss scientific matters concerning a particular resource. This includes resource assessment and advises senior management (administrative functionaries) on stock status, TAC recommendations, and controls. The working group includes modelers, biologists, environmental scientists, oceanographers, economists as well as Industry-based Observers (who do contribute to the process as well);
- Recommendations are reviewed by the Director: Research and the Head of MCM: Deputy Director General. Thereafter recommendations on a fishery are discussed at management advisory groups (MAG) where there is greater participation by stakeholders;
- Recommendations on the fishery are “signed off” by the Head of MCM (Deputy Director General) who submits for final approval to the Minister; and
- In some cases legal advice is sought and this may include changes to regulations and permit conditions (which can be changed without changing the ACT). Fundamental changes requiring policy revision and changes to the ACT are more complex and require parliamentary processing through a Bill before final approval can be made⁶.

All of South Africa’s marine fisheries are managed in this way – this includes at least 15 fisheries such as the sectors mentioned in section 4 as well as numerous minor fisheries like seaweed, aquaculture, mussels (and numerous other minor intertidal species exploited) and non-consumptive sectors such as shark cage diving and Boat-Based Whale Watching. Management of these fisheries varies from intensive (main commercial sectors) to lower profile with less formal management approaches. Assessments are done annually for all the main commercial species with the lower profiles sectors assessed on an *ad hoc* basis.

The number of fisheries managed has increased steadily in recent years, although the personnel capacity to do so has struggled to keep pace with the need. Up to the mid 1980’s only the main commercial fisheries were managed, and these took on a different approach with the declaration of the 200 EEZ in 1977. Perhaps the most significant development was political transition, which required a new perspective on marine resources including a new fisheries policy, replacement of the old Sea Fisheries Act with the MLRA, extensively revised regulations, and reallocation of fishing rights⁷.

⁶ South Africa’s MLRA was under revision at the time of preparation of this report.

⁷ All fisheries rights were reallocated in 2002 for five years and are due for long-term allocation (10 – 15 years) in 2006.

All of South Africa's main commercial fisheries are believed to be fully exploited with the only possible exception being the mid-water directed⁸ fishery for horse mackerel. Stock levels are generally low with most management strategies aiming for stock recovery by raising the spawning stock biomass to at least 50 percent of B_0 . This is true for the three Indian Ocean stocks considered in this report. Although all three stocks have very different dynamics (hake are a long-lived slow-growing species, horse mackerel are a shoaling highly migratory species reaching about eight years old and pelagic stocks are short-lived with stock levels fluctuating annually with environmental conditions). The most seriously depleted stocks are the linefish (predominantly endemic reef fish) which with the exception of a few, have been assessed as seriously depleted and below sustainable levels. Under such circumstances the MLRA mandates the state authority to take corrective action, including the closing of fisheries and or reduced effort and other management measures that facilitate stock recovery.

Most fishing gear types have at some point in time being used in South African waters. High seas gillnetting is banned and there is an array of measures restricting longline types, trawl nets, handlines, vessel types and power, hooks and many other fishing gear configurations. Although poor compliance and under-capacity to administer compliance and to conduct appropriate research are the major impediments, fishery compliance in South Africa has improved in recent years with an increasing number of convictions and some evidence that this is having a positive influence on stocks⁹.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Historically fisheries management in South Africa has depended on state revenue budgets to support administrative functions, compliance, and research. Industry taxes and levies were paid into a "Marine Living Resources Fund" (MLRF), although these funds were not necessarily channeled back into fisheries management. More recently this policy has been changed with all taxes and other funds recovered from the fishing industry allocated to the MLRF and MCM given greater autonomy to administer these funds for research and compliance¹⁰. An example is the building of four new fishery patrol vessels, which are expected to come into service in 2005 and the improvement of compliance monitoring. Budgets for MCM have increased systematically in the last ten years, although there are strict constraints on personnel deployment with the overall rationalization of employment in the government.

There are other sources of funding for fisheries management including International donor funds and alternative research funding through the National Research Foundation and a few other minor groups.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

South Africa has ratified the United Nations Convention on the Law of the Sea (UNCLOS) and the UN fish stocks agreement. Fisheries management strategies in South Africa have generally followed the FAO Code of Conduct for Fisheries and regionally initiatives taken to form Regional Fisheries Management Organizations. For the Atlantic this process is advanced and South Africa is a full member of the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the South East Atlantic Fishing Organization (SEAFO). Involvement in the Indian Ocean organizations is not as advanced and South Africa only has Observer status at the

⁸ Horse mackerel are also caught as both a directed and bycatch in the hake bottom trawl fishery.

⁹ An example is the prosecution of the illegal operations of the deepwater south coast rock lobster (Indian Ocean) which has since seen improved catch rates and higher stock estimates.

¹⁰ The exact budget for MCM and fisheries management was not known at the time of writing this report.

Indian Ocean Tuna Commission (IOTC). Initiatives to establish a ground fish forum (such as SEAFO) for the Indian Ocean have been slow, although it is in process¹¹.

South Africa has taken active steps with regard to International Plans of Action, although it should be kept in mind that the country itself has been going through a very difficult transition period since 1994. The introduction of high seas fishing permits for flag-state vessels has helped control domestic effort, although other high seas activity by flags-of-convenience countries has been difficult to administer. Monitoring of the landings of IUU vessels has improved dramatically with numerous arrests and convictions through international collaboration (particularly for Patagonian Toothfish). The result of these actions has been the general avoidance of IUU vessels landing in South African ports, as well as other ports in the region in countries signatories to SEAFO and the SADC Fisheries Protocol (Southern African Development Community). As a member of both ICCAT and CCAMLR, South Africa also complies with Catch Documentation Schemes and has taken initiatives in all longline fisheries to introduce methods to mitigate against seabird mortality. South Africa is also a signatory to the International Plans of Actions to limit incidental seabird catches. A national plan of action on shark management has been initiated and is in process of consultation and is expected to be submitted to FAO in 2005.

PARTICIPATION IN REGIONAL FISHERIES BODIES (RFB)

With regard to regional fishery bodies (RFB), South Africa has no formal strategy to implement measures adopted by these bodies other than the MLRA. As a signatory to any RFB however, the Minister has authority to act as he sees fit, although in the case of SEAFO there has been no apparent direct application of the fishery measures adopted. For the Indian Ocean, a concerted regional strategy has not yet been introduced.

SUMMARY AND CONCLUSIONS

Indian Ocean fisheries in South Africa are relatively minor when compared to the large scale industrial fisheries found on the South African Atlantic coastline. However significant commercial exploitation does occur in the southern Indian Ocean adjunct to the Atlantic and these are the principle fisheries described in this review. It should be noted that apart from the demersal trawl, purse seine (small pelagic) and midwater trawl fisheries (which are the largest in term of volume and income), other fisheries in the Indian Ocean contribute significantly to regional economies and employment. The dedicated squid jig fishery is entrenched in the Eastern Cape economy and to a lesser extent the prawn trawl fishery off Kwazulu Natal also contributes to the socio-economic stability of the area. The extensive linefish fishery which has both commercial and recreational components is substantial in terms of people involved, although stocks exploited have declined significantly.

Fisheries management in South Africa is generally good with all fisheries managed on a sustainable basis. International protocols and agreements have been applied within the capacity of the state authority. The fisheries sectors are not without problems, particularly with regard to compliance, although indicators are that this is improving as more funds are directed at the problem areas. South Africa has taken the lead in Southern Africa with regard to the implementation of International agreements and the formation of Regional Fisheries Organizations. It should however be appreciated that fisheries in South Africa are still in transition and the pending allocation of long-term rights (2006) are expected to absorb a large proportion of the management capacity, whilst still trying to maintain a good research and fisheries management base.

¹¹ South Africa was represented at the first meetings of the South West Indian Ocean Fishery Commission in 2001.

APPENDIX TABLES

Current management of marine capture fisheries in South Africa

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	100%	100%	100%	Increasing
Regional	0	0	0	n/a
Local	0	0	0	n/a

n/a = not applicable

Summary information for three largest fisheries (by volume) in South Africa (Indian Ocean) (2004)

Category of Fishery	Fishery	Volume mil tons	Value* million US\$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	Hake Trawl	161 000	130	33	69	Yes	2 000	90
	Small Pelagic	600 000	25	20	13	Yes	600	54
	Horse Mackerel	30 000 - 58 000	33	100	18	Yes	100	1
Artisanal	Traditional linefish	15 000	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	West Coast Rock Lobster	2 400	200					
	Beach seine	1 000	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Recreational	Linefish	6 000	10	100	100	Yes	3 000	2 000
	Whale watching	n.a.	n.a.	n.a.	n.a.	Yes	20	20
	Shark Cage diving	n.a.	n.a.	n.a.	n.a.	Yes	10	10

* Value in 2002 U.S. Dollars.

** % values are based on totals for each category of fishery.

Note: With respect to South Africa, volumes and values are the authors best estimates. These numbers have had to be apportioned according to the approximate amounts caught in the Indian and Atlantic Oceans.

n.a. = not available

Use of fishery management tools within the three largest fisheries in South Africa (Indian Ocean)

Category of Fishery	Fishery	Restrictions				License/Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Hake Trawl	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
	Small Pelagic	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No
	Horse Mackerel	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No
Artisanal	Traditional linefish	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
	West Coast Rock Lobster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	Beach seine	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Recreational	Linefish	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No
	Whale watching	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
	Shark Cage diving	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes

Costs and funding sources of fisheries management within the three largest fisheries in South Africa (Indian Ocean)

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Hake Trawl	Yes	Yes	Yes	Yes	Yes	Yes
	Small Pelagic	Yes	Yes	Yes	Yes	Yes	Yes
	Horse Mackerel	Yes	Yes	Yes	Yes	Yes	Yes
Artisanal	Traditional linefish	Yes	Yes	Yes	Yes	Yes	Yes
	West Coast Rock Lobster	Yes	Yes	Yes	Yes	Yes	Yes
	Beach seine	Yes	Yes	Yes	Yes	Yes	Yes
Recreational	Linefish	Yes	Yes	Yes	Yes	Yes	Yes
	Whale watching	Yes	Yes	Yes	Yes	Yes	Yes
	Shark Cage diving	No	No	No	Yes	Yes	Yes

Compliance and enforcement within the three largest fisheries in South Africa (Indian Ocean)

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other
Industrial	Hake Trawl	Yes	Yes	Yes	Yes	Yes	
	Small Pelagic	Yes	Yes	Yes	Yes	Yes	
	Horse Mackerel	Yes	Yes	Yes	Yes	Yes	
Artisanal	Traditional linefish	Yes	No	Yes	Yes	Yes	
	West Coast Rock Lobster	Yes	Yes	Yes	Yes	Yes	
	Beach seine	No	No	Yes	Yes	No	
Recreational	Linefish	No	No	Yes	Yes	Yes	
	Whale watching	Yes	Yes	Yes	Yes	Yes	
	Shark Cage diving	No	Yes	Yes	Yes	Yes	

Capacity management within the three largest fisheries in South Africa (Indian Ocean)

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, specify objectives of capacity reduction programme
Industrial	Hake Trawl	No	Yes	Constant	Yes	Effort Control
	Small Pelagic	No	Yes	Increasing	Yes	Effort Control
	Horse Mackerel	No	Yes	Constant	Yes	Effort Control
Artisanal	Traditional linefish	n.a.	Yes	Constant or decreasing	Yes	Effort Control
	West Coast Rock Lobster	n.a.	Yes	No	Yes	Effort Control
	Beach seine	n.a.	Yes	Constant or decreasing	Yes	Effort Control
Recreational	Linefish	Yes	No	Decreasing	Yes	Minimize Effort
	Whale watching	No	Yes	No	No	
	Shark Cage diving	No	Yes	No	No	

n.a. = not available.

Country review: United Republic of Tanzania

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Fisheries Division, Ministry of Natural Resources and Tourism, United Republic of Tanzania

December 2003

INTRODUCTION

Tanzania is a coastal state lying between 29° and 49° East longitude and 1° and 12° latitude south of the Equator. The country is well endowed with both marine and inland fishery resources. The marine waters comprise 64 000 km² as territorial waters and 223 000 km² as offshore waters (EEZ) (MNRT, 1997). The length of coastline, including Zanzibar and Pemba islands, stretches along approximately 1 424 km of the Indian Ocean.

The marine coast of Tanzania has a narrow, sharply falling shelf. Marine fishing activity is generally concentrated inshore and around the islands of Zanzibar, Pemba and Mafia. Fishing crafts are primarily ngalawa (outrigger canoes) or small dhow-type planked boats (mashua), and are mostly propelled by sail. The marine catch is composed of a great diversity of species, including snapper, kingfish, shark, rays, shrimps, lobsters, sardines and sea cucumbers.

In addition, a small fleet of steel- and wood-hulled trawlers and purse seiners are licensed to fish in the territorial waters (number of licenses have peaked at 24 in 2004). Trawling for shrimps and purse seining for sardines expanded rapidly in the late 1980s - early 1990s as moves towards structural adjustment and economic liberalization came into effect. The shrimp fishery is based primarily around the Rufiji Delta, some 200 km south of Dar-es-Salaam, and in areas around Bagamoyo, about 100 km to the north.

In general, fisheries resources have been regulated through the 1970 Fisheries Act and subsequent Principle Regulations.¹ However, a New Fisheries Act has been established and is waiting for official announcement. Historically, fisheries management in Tanzania has focused primarily on the great lakes, namely Lake Victoria, Tanganyika, and Nyasa, and the coastal fisheries were essentially unrestricted (although fishing licenses were required).

In the process of improving the fisheries sector, the Fisheries Division had developed the National Fisheries Sector Policy and Strategy Statement (1997), which recognises community participation in fisheries management. The policy recognises the need for private sector, community, non-governmental organisations and other community-based organizations (CBOs) involvement in the development and management of the fisheries resources. Such a policy has been applied in the lake fisheries and, therefore, was recently launched in the coastal fisheries. Such an approach will prove an integral component to the sustainable development of the marine capture fisheries.

POLICY FRAMEWORK

The current National Fisheries Sector Policy and Strategy Statement (MNRT, 1997) was adopted by the Government in 1997 and are based on the overall objectives of the Government, including poverty reduction, creation of employment opportunities,

¹ Fisheries (General Amendment) Regulations, 1994 (G.N. No. 369).

increased food security, increased economic growth and sound environmental management. The main objective of the Fisheries Sector Policy is to promote conservation, development, and sustainable management of the fisheries resources and are addressed by the following 13 policy and strategy statements:

- Enhanced resource management and control mechanisms;
- Efficient resource utilization and marketing;
- Enhanced applied/strategic research;
- Improved knowledge of fisheries resource base;
- Aquaculture development;
- Community participation; and
- Inter-sector collaboration and regional and international co-operation.

The fisheries policy fits quite well to other national policies. For example it takes into consideration the Poverty Reduction Policy (Ministry of Natural Resources and Tourism 1997, p.5), government reforms and the devolution of fisheries management with the local governments (Ngwilizi, 2001). It is argued that although the current government system is decentralized, power is still concentrated at the centre that is the central government within the ministries (Masalu, 2000, p. 492).

The policy also recognizes the need for integrating fisheries into Coastal Area Management and community participation is advocated for proper management and rational exploitation of the coastal resources.

Regional and international collaboration is also illustrated in the policy statement in that the EEZ and the three Great Lakes (Lakes Victoria, Tanganyika and Nyasa) require collaborative, international management (Ministry of Natural Resources and Tourism 1997, p.16).

In 1998, the Fisheries Division developed an Implementation Plan (reference?), which reflected the National Policy. This forms a basis for implementation of the Policy. Although this was a positive move towards the improvement of the sector, the Plan lacked empowerment capabilities as it is not consistent with the Fisheries Act No 6 of 1970.

In the process of operationalizing the Fisheries Policy and Implementation Plan, a step further was taken. This involved making a thorough study of the national fisheries was conducted with the assistance of the Japanese Government and culminated in 2002 with the Master Plan on Fisheries Development². In the Master Plan, fifteen priority projects were indicated, seven of which specifically targeting the coastal fisheries³. Although not all encompassing, the study managed to bring out potential problems and identified those areas, which if dealt with effectively would bring about positive changes in the industry.

In recognizing the special issues related to the coastal fisheries and to the marine prawn fishery in particular, the Division of Fisheries instigated the development of a Prawn Fishery Management Plan with the assistance of the FAO⁴. In following a participatory approach, a series of workshops were held in which representatives from the small-scale, newly developing mid-scale and industrial sectors as well as representatives from District and National Governments; drawing on experiences from other national projects with experience in community-based management of natural resources. A draft plan was approved by the participants and is in the process of being finalized by the Division of Fisheries. The Prawn Fishery Plan mirrors the

² "The Master Plan on Fisheries Development in the United Republic of Tanzania", June 2002, Japan International Cooperation Agency and the Tanzanian Ministry of Natural Resources and Tourism.

³ Marine Fisheries Sub-sector Capacity Building Programme; Dar es Salaam Fisheries Infrastructure Improvement Programme; Fisheries Communities Development Programme; Fisheries Financial Support Programme; Fisheries Co-management Programme.

⁴ UN FAO TCP/URT/0168 (A); Capacity Building in Planning and Co-Management of the Tanzania Prawn Fishery.

Master Plan in that it identifies issues related to the management and development of the coastal fisheries, such as research needs, increased control on fishing effort, and assisting in processing and marketing within the small-scale sector. The Prawn Fishery Plan highlighted the need to establish a National Prawn Fishery Management Advisory Committee as an apex body to advise the authority on the prawn fishery at national level. At the local/village level, it was considered very important to establish what was referred to as Village Resources and Environment Management Committees (VIREMACO).

Other relevant policies

In the Marine sector, there are several policies relevant to fisheries and may influence the development of this sector. Such policies include:

- National Tourism Policy, 1999
- National Forest Policy, 1998
- The Wildlife Policy of Tanzania, 1998
- The National Investment Promotion Policy, 1996
- National Environment Policy⁵
- Agricultural and Livestock Policy, 1997

Coastal areas are known for their potential in attracting tourist activities. These activities along the coast claim areas that are vital for the coastal ecosystem to sustain coastal resources including fisheries. Construction of tourist hotels may lead to clearance of mangrove area known to be important on the sustainability of the marine ecosystem and those fisheries that rely on such habitats. In this case, the fisheries policy on its own may not be adequate in addressing issues pertaining to the sustainability of the prawn fishery.

Likewise, the Investment policy may not take into consideration the question of the maintenance of coastal marine environment in its promotion of development. Such promotion may lead to excessive deposition of industrial effluence and negatively affect the marine ecosystem and thus the fish resources therein.

In this case, an Environment Policy becomes an extremely important tool in maintaining the natural environment through, for example, the requirement of Environmental and Economic Impact Statements before the approval of development plans. Such a policy is in advanced drafting stage in Tanzania.

Apart from the above policies, there has been an effort to develop guidelines to ensure environmental sustainability when undertaking new economic activities and include:

- Mariculture Investment's Guide (2001)
- Guidelines for Coastal Tourism Development in Tanzania (2003)
- Investors' Guide to Tanzania (1998) – this provides relevant information for investors but also investors are guided to consult relevant ministries where technical information to facilitate their investment is required.

In the same spirit, strategies have been developed aiming at encouraging appropriate use of the coastal areas for the maintenance of all resources along the coastal area. The National Integrated Coastal Environment Management Strategy (2003) is one of such strategies.

LEGAL FRAMEWORK

The 1970 Fisheries Act repealed the Fisheries Ordinance Cap 295 (Monga, 2000) that was enacted during the colonial regime. The Fisheries Act No 6 of 1970 sets a legal framework within which the fish resource would be managed, conserved, protected

⁵ Under development by the Vice President's Office.

by protecting breeding sites, nesting sites as well as prohibiting destructive gears. Harvesting rights are defined in the Fisheries Act No 6 of 1970; however this Act has been reviewed and replaced by the new Fisheries Act No 22 of 2003 (not yet gazetted).

Since 1975, efforts have been made to manage marine reserves through Marine Reserves regulation of 1975. However it was not until 1994 that the Marine Parks Unit was established under the Marine parks and Reserves No 29 of 1994. Through this Act, two marine parks have been established and several small islands declared as marine protected areas, particularly around Dar es Salaam. In 1995 Mafia Island Marine Park was established followed by Mnazi Bay Marine Park in 2000.

Further steps are being taken to review principal regulations to accommodate new development in the industry and cater for the legal requirements of the new Act and the Fisheries Policy of 1997. It is important to note that an element of harmonizing the regulation has been considered to put into consideration the international obligations, requirements with reference to FAO Fisheries Code of Conduct (FAO, 1995). Even at local level, the Local Government authorities have considered the harmonization of legal framework particularly when developing by laws in areas where the managed resources are shared. This is important since fish does not recognize political boundaries.

Management of fisheries resources has been the responsibility of the government (Ministry of Natural Resources and Tourism 1997, p.19). The main Fisheries Act and regulations thereafter empower government personnel to manage the fisheries resources in Tanzania. It is in accordance to this Act, that the government and its agencies oversee fish resource management and development.

Under the current government structure, the Ministry of Natural Resources and Tourism formulates policies, laws and revises fisheries legislation. It has the role to ensure that the resources are managed in a sustainable way and optimally utilized for the benefit of the people. Adapted from Bulayi (2001), the formal government institutional set-up and decision-making mechanism for Tanzania fisheries is shown in Figure 1. This system involves long lines of communication and it is complex. Other government departments, which provide support services to fisheries management, include Tourism, Forestry and Wildlife.

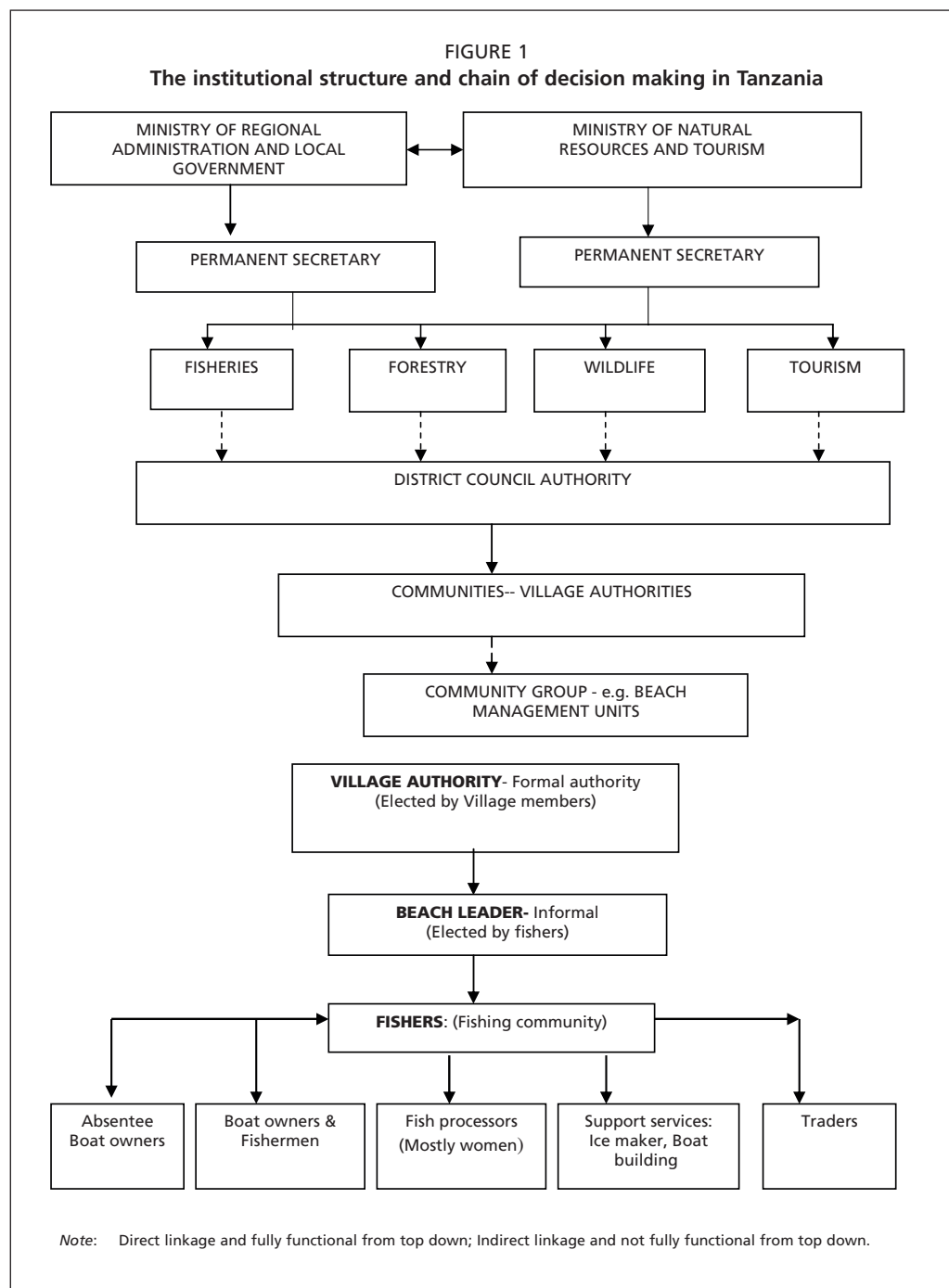
The roles and responsibilities of “participating institutions”⁶ in implementing and monitoring the National Fishery Policy are clearly defined in the Policy and Strategy Statement and are crucial in the process of making effective contribution towards coastal resources management.

Monitoring, control and surveillance (MCS)

In Tanzania, a national MCS programme, involves law enforcement agencies and other stakeholders including communities in monitoring fisheries activities. The core functions of MCS as stipulated in the law include issuing fishing licenses, prevention of illegal fishing and the enforcement of fishing gears and other restrictions particularly in inland waters.

Fisheries enforcement is done both at national and local levels where the local authorities are involved. Generally the costs associated with implementation of this mechanism are too high to be met by the government alone. In the process, Fisheries patrols have been organized and conducted in near and offshore marine waters. In both inshore (prawn fishery) and offshore waters where large vessels are involved, observers programme has been developed and implemented. In this respect, the monitoring of the prawn fishery is done through such a programme in the three specified zones. In

⁶ Defined as the Fisheries Department, Local Government, Local Community, NGOs, Private Sector, Regional and International Community, and Government Agencies and Other State Machinery (MNRT, 1997).

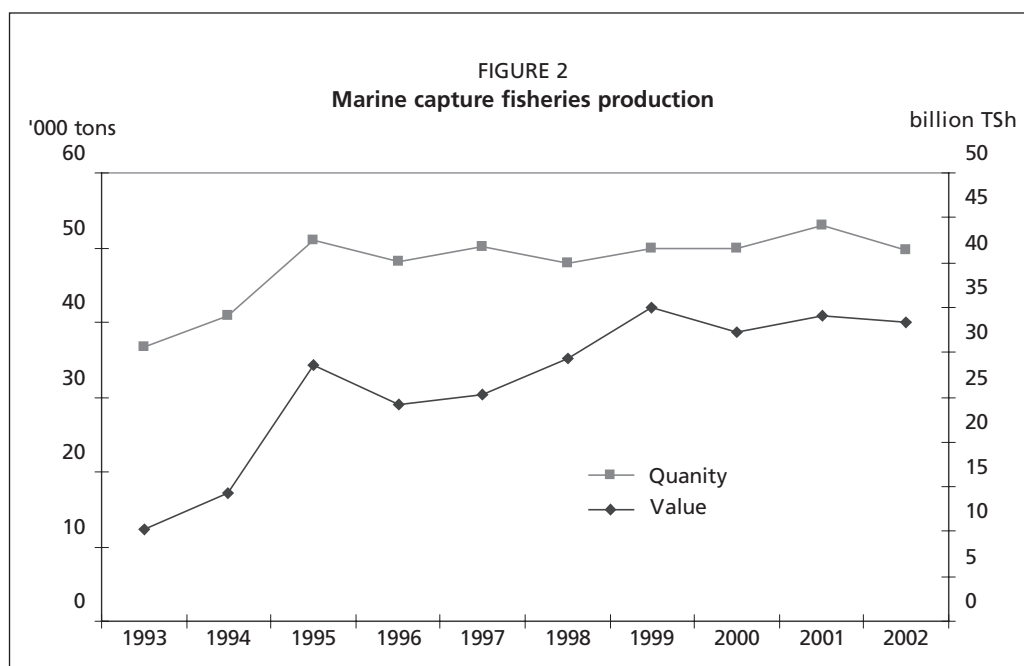


recent years the Government has considered developing system, which would involve fishing communities in implementing MCS.

The local authorities have been developing bylaws, which are relevant in fisheries management targeting at the improvement of MCS activities.

Fisheries judicial system

The judicial system in Tanzania doesn't provide for fisheries courts; violations in fisheries are treated as civil cases. This has been observed to be a problem in MCS system as the normal legal process is lengthy and has a record of poor prosecution and low penalties for fisheries law/regulations violations. Various attempts have been made to revise the fisheries legislation, to create deterrent penalties and to train Fisheries staff in MCS and prosecution.



STATUS OF FISHERIES

The Tanzanian coastline is 1 084 km long from the southern border with Mozambique to the north border with Kenya. The marine fishery is divided into Territorial waters, which extend up to 12 nm. The Exclusive Economic Zone (EEZ) declared in 1989, which extends up to 200 nm from the shoreline (Tanzania High Commission-London 2000). The territorial sea has an area of 64 000 km² and the EEZ area is around 223 000 km² (Idara ya Uvuvi, 1999, p.3).

Artisanal fisheries dominate fishing in Tanzania. The artisanal fishermen produce about 90 percent of the total fish landings; while only ten percent is derived from industrial prawn fishery. In most cases the size of the artisanal fishing vessels range from 4-10 m, few prawn-fishing vessels have length between 12-25 m (MNRT 1996). In recent years the average annual fish catch in Tanzania is estimated to around 350 000 metric tons, 19 percent is marine catch and 81 percent is freshwater catch (MNRT 1996).

The contribution of fisheries sector to the economy of the country has increased for the past two decades through exportation of commercial fish and fishery products. It has been reported that, fish contributes nearly 30 percent of the total animal protein intake in the country (MNRT 1999). It is well known that prawn is one of the most important exportable products in the coastal fishery in Tanzania. However, finfish provides protein source of food to the coastal communities and contributes substantially to the nutrition status for them.

The Coastal Fishery

In the marine fishery, the near shore stocks seem to have been severely exploited. However, it is difficult to say the exact status of such stocks, as there has been no fish stocks assessment done in recent years.

With regard to prawn stocks potential, there have been various studies using various techniques: FAO estimated maximum sustainable yield (MSY) at 2 000 tonnes in 1997; South West Indian Ocean Project (SWIOP) in 1990 estimated the potential as 1 050 tonnes and in 2001 the Tanzania Fisheries Research Institute (TAFIRI) estimated MSY at 497 tonnes (Mushi and Kalikela, 2002). The number of licensed prawn fishing trawlers has steadily increased from 12 in 1996 to 24 in 2003. The fisheries statistics

indicate that the catch per unit of effort (CPUE) for prawns has decreased from 610 kilograms per day in 1990 to 271 kilogram per day in 2000 and to 307 kilograms per day in 2001 (Mushi and Kalikela, 2002).⁷ Most of the available data are from the industrial sector of the prawn fishery leaving out substantial quantities exploited by the small-scale operators in the fishery; underestimating the true catches and making management decisions more difficult.

Stock of prawn has shown declining trends and efficiency to the point where prawn trawler owners and their Association⁸ have called for improved management within the Fishery.

Other species are also exploited but without knowing the existing stocks potential. This is one area, which the management would take serious measures and try to invest in stock assessment so as to determine the existing stocks potential in the marine fishery.

EEZ Fishery

Licensing for fishing in the EEZ began in 1998 with nine licensed vessels. Since then, the number of licenses has increased to 64 in 2004 and the available catch data show increased catches from 2 506 tonnes in 2001 to 14 917 tonnes in 2003 (source).

The fish potential production in the EEZ has not been assessed. However, licensed vessels in this fishery have indicated that a potential worth investment exists.

TABLE 1
Fish catches from the Tanzanian EEZ fishery for 2001 – 2003

Year	Type/species of fish caught in the EEZ (weight in metric tonnes)								Annual totals
	Swordfish	Yellowfin tuna	Big eye tuna	Albacore	Skipjack tuna	Marlin	Shark	Others	
2001	208	60	23	36	1	18	0	2 158	2 506
2002	1 898	357	82	55	0	0	48	4 173	4 904
2003	14	3 045	181	72	1 734	0.	0	9 870	14 916

Source: Fisheries Division, Ministry of Natural Resources, Tanzania.

MANAGEMENT ACTIVITIES

The Fisheries Division of the Ministry of Natural Resources and Tourism is the technical division responsible for management and advisory roles for fisheries management. The Division also facilitates investment within the sector by providing fishing licenses for the exploitation and general utilization of the fishery resources.

Basically the Fisheries Division continues to carry out responsibilities that have national and international implications. These include formulation of national fisheries policy and policy instrument required for the policy objectives to be achieved. Others include setting rules governing resource utilization and conservation, determine sizes and types of fishing gears which are appropriate in a particular fishery, conduct research, provide training and ensure implementation of regional and international obligations related to the sector. Management tools used in the industrial prawn fisheries include:

- Imposing a closed fishing season from 01 December – 29 February each year.
- Zoning of the prawn resource fishing grounds in efforts to balance the distribution of the fishing pressure.
- To put onboard fishing vessels fisheries staff as observers whose duty is to ensure adherence of the laws and regulations on the exploitation by the operators.

⁷ The slight increase does not mean that the stocks have increased but it could be the result of an increased fishing efficiency by the trawlers not taken into account in the effort calculations. These include increased effort from 3 352 to 3 882 fishing days.

⁸ The Industrial Fishing Processors Association (IFPA).

- Restricting the fishing time for the prawn trawlers to between 6:00 a.m to 6:00 p.m. This is aimed at reducing the fishing pressure and conflicts among the prawn industrial trawlers and artisanal fishers.
- Restriction of the size of the prawn fishing vessels; maximum of 150 Gross Tonnage (GRT) and not more than 500 Horsepower (500 HP).
- Restricting the depth; fishing vessels are not allowed to fish in waters less than 5.0 meters deep. This is meant to avoid the destruction of the environment.
- Restricting the number of fishing nets in each vessel to two (2) nets only at a trawling time.
- The fishing companies are obliged to present to the Director of Fisheries their monthly fishing statistics before 5th date of each month during the fishing season, failure to which the vessel will be stopped from fishing.
- Every captain for the fishing vessel is obliged to communicate with the Director of Fisheries daily while fishing in any of the three zones. This communication is meant to monitor the fishing vessels' fishing position.
- Involvement of the fisheries stakeholders in the co-management of the resource as indicated in the National Fisheries Policy of 1997.

Additional management options and their impediments to use in Tanzania

Individual quotas

This particular management tool is not currently used in Tanzania due to the difficulty and expense of monitoring the small-scale fishers. However, the potential to use a quota system exists within the trawling sector due to the limited number of vessels and the use of a single landing site in Dar es Salaam (single or limited number of landing sites).

Territorial use rights

This system is not directly used in Tanzania. However, this mechanism is used in the coastal fish resources exploitation where prawn trawlers are restricted to areas beyond 5 m depths to accommodate the small-scale fishers.

Community rights

The 1997 National Fisheries Policy advocate for community based/participatory coastal resources management. Community rights in the fisheries industry in this country are not well defined as individual licenses proved the right to fish throughout the national coastline; therefore, migrant fishing is permitted.

Integrated Coastal Management

Other management efforts made include the establishment of programmes that aim at embarking on an integrated coastal management approach. Examples are in Tanga, along the northeast coast, where the Regional and District Government Authorities are implementing integrated coastal management focused on coral reef restoration and community-based management.

Also, integrated coastal management initiatives are being developed for Dar es Salaam Marine Reserves to address the critical problems of reef pollution and illegal fishing practices including dynamiting fishing (Salm *et al.*, 1998). These efforts have been consolidated and co-ordinated by relevant Authorities and other institutions dealing with coastal management are the National Environmental Management Council, NEMC and training and research institutions, which include the University of Dar Es Salaam and the Institute of Marine Sciences Zanzibar (IMS). Other non-governmental organizations may also be involved on an ad hoc basis.

BOX 1

Fisheries Co-Management in Tanzania

Co-management is one way in which community-based resource management has been advocated for in Tanzania.

The Tanzanian Fisheries Division has designed a community-based fisheries management system, which is basically a sharing of responsibility between resource users and government, devolution of power and authorities to fishing communities, as it is thought this approach would be an improvement on the current top-down management system. Some responsibilities including monitoring, control and surveillance will be shared with the resources users (that is fishers and the fishing communities under the existing village leadership). As in Lake Victoria, where the Beach Management Units (BMUs) have the responsibility to manage and control some fisheries activities including monitoring, surveillance and control, the concept is likely to be introduced in the coastal fisheries. Given the nature of coastal marine fishery, other institutions may be introduced where applicable and need is perceived. Such institutions may require management committees. This has already been considered relevant in the Prawn fishery.

The Fisheries Division in the Ministry of Natural Resources and Tourism aspires to devolve some responsibilities and powers to fishing communities, including formulation of by-laws, data collection, law enforcement, and monitoring as well as involving them in formulation of general management plans appropriate for fishing communities at the village level. It is believed that if fishing communities are sensitized to the benefits and responsibilities of managing their resources, they will efficiently carry out fisheries management activities.

Some fishing communities have been organized in groups in their respective fishing areas/village through a community management organization. This organization has been used as a basic unit of fisheries management at community level. Communities have been given responsibilities for managing fisheries resources at village level subject to bylaws, rules and conditions which are within the Fisheries Act. However local government authority has a mandate to co-ordinate and supervises community development activities.

In Tanzania, this is a recent move in the management and much time and effort will be necessary considering increasing public awareness on the importance and the need for collaborative and participatory resources management.

TABLE 2
Management costs and revenues in Tanzania

Year	Management Cost (Tsh)		Revenues (Tsh)
	Fisheries Management	Research	
1998/1999	n.a.	n.a.	2 895 749 769.00
1999/2000	n.a.	n.a.	2 709 703 484.50
2000/2001	2 619 923 200	374 006 400	4 475 420 167.55
2001/2002	2 636 612 200	378 206 400	4 042 963 700.00
2002/2003	2 658 962 000	412 790 000	n.a.

n.a. = not available.

Source: MNRT Budget (1996-2003)

COST AND REVENUES OF FISHERIES MANAGEMENT

Management activities in Tanzania include monitoring, surveillance and control, law enforcement, planning and development, awareness, capacity building, research and training.

Currently, the Division is enjoying the so-called 'Retention Scheme' whereby the revenue accrued from the fisheries resources rent is allocated in the annual budgetary allocation. Provisions have been made within the New Fisheries Act to establish a Fisheries Development Fund which would be a parallel source of funding to meet some development and resource management obligations.

Over the past ten years, revenues accrued to the Government from the Tanzanian fisheries have increased:

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

The country also implements various regional and UN conventions/agreements including the FAO Code of Conduct, which provides for better fisheries resources management and utilization, IUU, Convention of Biodiversity (CBD), UNCLOS, CITES and other relevant UN/FAO protocols.

PARTICIPATION IN REGIONAL FISHERY BODIES

Tanzania is party to most relevant regional and international bodies in order to meet regional and international obligations. For instance, the country is a member of SADC and has recently ratified the SADC Fisheries protocol.

Tanzania is also a member of and implements important regional and international resolutions that are made to effectively manage and rationally utilize available fisheries resources and their development, e.g. SWIOP, International Tuna Commission

Generally, the country is quite active in participating in different regional and international issues that are considered relevant in the achievement of effective marine resource's conservation, protection and management at the same time making sure that its people enjoys and benefit from such resources.

SUMMARY AND CONCLUSIONS

Tanzania has attained a reasonably high stage in terms of policy formulation in the Fisheries sub-sector of the economy. Some of the reasons that lead to such advancement are as follows:

- The National Fisheries Policy Statement and its Strategies was formulated and approved in 1997 for effectiveness and efficient management and resource use in a sustainable manner.
- The policy was formulated through participatory approach with a view of involving people at various stages and sectors so that it could be enriched and therefore useful to the entire community.
- It recognizes the needs for equity in resources allocation whereby gender segregation is not a welcome.
- Areas for investment are put open to those in need of investing in the sub-sector and some guidelines have been prepared to assist in that respect.

However, the status of the marine fishery resources is not well known. This does not put the country in a good position to plan for the resource utilization in an effective way and provide for better management of these valuable resources, which supports quite a good size of the coastal population.

Co-management/Participatory resource management being introduced has proved to be an effective approach in fisheries management elsewhere can also prove effective in the country. It has to be noted however that introduction of co – management is a long process with high initial cost. As it has been observed elsewhere in the world determination and awareness to stakeholders is quite necessary as it may be dangerous to assume that they all understand the approach.

In respect of achievement of the policy objectives, which are quite promising, capacity building at all levels is required. The policy reforms that are taking place within the Government has to take into consideration specific nature of individual technical ministries so that such it does not disrupt the set and end up in difficult situation. This has specific orientation to the data collection at grass root level required by the management to enable proper decision-making and better planning in the sector.

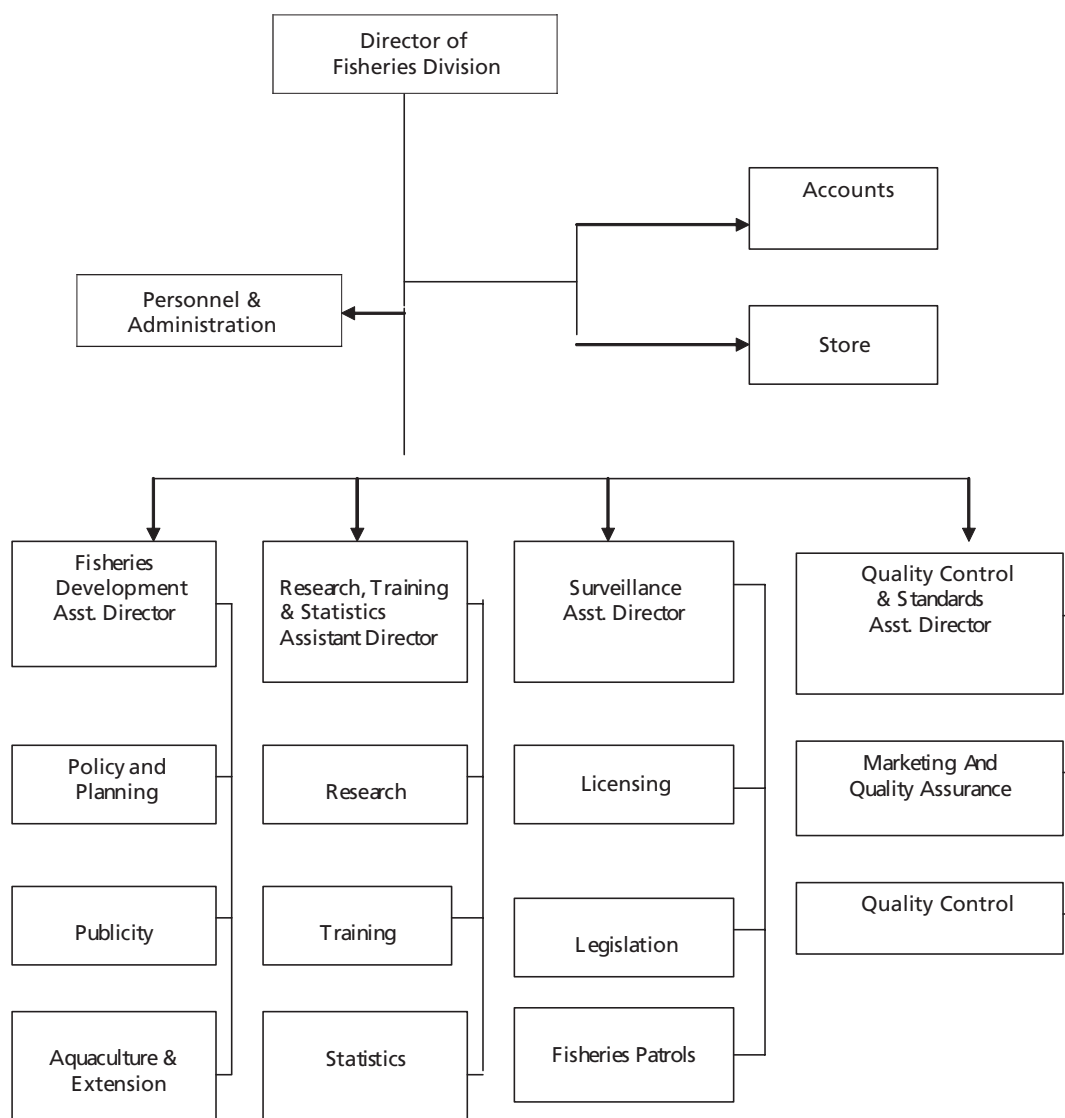
In view of the above, the following form some recommendations that are considered important in the management and development of the marine fishery in Tanzania:

- That policies being formulated involve all relevant stakeholders;
- That proper dissemination of information regarding policies, legislation and fisheries management is attained to ensure informed stakeholders and improved implementation of such policies;
- It is recommended that poverty alleviation strategies take into consideration the environment and sustainability of the natural resources;
- That better knowledge of the marine resources, including basic data collection statistical capacities, is given priority given its importance in the management of living resources;
- That government reforms involve technical ministries so that any decision taken takes care of the true nature and situation of such ministries;
- That the sector is adequately financed and equipped with enough human resources so that the sector can be well managed in line with the Government policies; and
- That participatory marine resource and environment management is given adequate consideration among other strategies.

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APPENDIX: ORGANIZATION STRUCTURE OF FISHERIES DIVISION



During the first half of the 1990s, in response to the increasing concern about many of the world's fisheries and following the United Nations Conference on Environment and Development (UNCED), a number of international fisheries instruments provided an impetus for countries to strengthen their fisheries management. A key step in supporting such efforts is the development of more detailed, systematic and comparable information on fisheries environments and management trends. The *State of World Marine Capture Fisheries Management Questionnaire* was developed by FAO in 2004 to help meet this need. The results have been grouped by region and are reported in this publication. In reviewing the questionnaire responses, we are able to look back to see how countries responded, to examine whether more fisheries are managed and to determine whether the management tools and strategies employed have improved the overall situation in marine capture fisheries. Trends in legal and administrative frameworks, management regimes and status of marine capture fisheries are analysed for 32 countries in the Indian Ocean and presented as an easy-to-read and informative reference for policy decision-makers, fishery managers and stakeholders.

