BOBP/REP/113

Report of the National Workshop on Monitoring, Control and Surveillance in Marine Fisheries

Maldives

22 - 23 March, 2009
Malé, Maldives

BAY OF BENGAL PROGRAMME **BOBP/REP/113**

Report of the National Workshop on Monitoring, Control and Surveillance in Marine Fisheries – *Maldives*

22-23 March 2009
Malé, Maldives

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Prospectus

1.0 Background and Rationale

Monitoring, control and surveillance (MCS) of fisheries resources has evolved over the past three decades from simple policing to a key instrument of management. Since the acceptance of the United Nations Law of the Sea (UNCLOS) and formulation of the 1995 Code of Conduct for Responsible Fisheries by the Food and Agriculture Organization (FAO) of the United Nations, it is now widely accepted that the right to fish comes with the responsibility of fishing sustainably. It is now also widely recognized by the fisheries managers that irrespective of the type of management they practice (community, government, private), a functional MCS regime is a pre-requisite.

Fisheries and Maldives are conjoining entities. Fisheries form one of the prime components of the Maldivian economy. Maldives is an archipelago of nearly 1 200 coral islands grouped into 19 widely dispersed atolls covering an area of nearly 90 000 km^2 in the centre of the Indian Ocean. The country's Exclusive Economic Zone (EEZ) covers an area of nearly one million km^2. Currently fisheries account for 4.72 percent of GDP (at constant prices in 2008), 7.61 percent of employment (2006 Census) and 98 percent of the country's export commodities (in value terms - 2007).

Maldivian fishers use six type of fishing vessels: mechanized Masdhoni, sail Masdhoni, mechanized Vadhu, sailing Vadhu, trolling vessels and rowing boats. At present, mechanized Masdhonis constitutes 91 percent of the fishing vessels. Trolling vessels are not in use in recent years. The number of trips made by these vessels has also come down - for mechanized Masdhonis from 1 89 941 trips in 2005 to 1 72 025 trips in 2007.

On the other hand, between 2005 and 2007, the catch per unit of effort (CPUE) has increased from 948 kg to 1 622 kg for mechanized Masdhonis and from 91 kg to 230 kg for sailing Masdhonis. Overall, the average CPUE (for all boats) increased from 273 kg to 522.4 kg during 2005-2007 – that is an increase of 91 percent. The highest increase in CPUE is observed in rowing boats (222 %) and sailing Masdhonis (153 %).

Maldives is traditionally a tuna fishing nation. The main characteristics of tuna fishing are live bait and pole and line fishing. While over the years, tuna fishing has evolved as an industrial activity in the Maldives; reef fishery has remained mostly as a subsistence and small-scale activity. Reef fisheries resources comprise sea cucumber, groupers, lobsters, reef sharks, turtles, giant clams, various bait fish resources and other types of fin fish species. However, presently some reef fishery resources are either heavily or fully exploited or are under the threat of becoming so. The immediate consequence of overharvesting is a loss in future income and food availability. A long-term consequence of severe depletion or collapse of critical species (*e.g.* reef shark) could lead to adverse impacts on the entire reef ecosystem. The principal reef resources management issues can be classified into three categories: (1) overharvesting of stocks, (2) interactions and use conflicts and (3) physical removal, alteration and damage to the coral reef ecosystem.

The Fisheries Law of Maldives, 1987 is the governing law in the fisheries sector. As per the law, the EEZ of the country is specified. The Law empowers the Ministry of Fisheries and Agriculture (MoFA) to regulate and develop the fisheries sector. Other applicable laws include the Ocean Territories Act (Act No. 6/96), Environment Protection and Preservation Act (Act No. 4/93), and other laws, decrees and regulations relating to the use of the EEZ, fisheries, environment, business, foreign investment and so on.

In October 2000, as part of the FAO's FishCode Programme, an expert mission reviewed aspects of MCS in Maldives. The MCS review evidenced the need to update the current Fisheries Act of 1987 to address *inter alia*: (i) protection of the interests of fishers *vis-à-vis* competing interests in the reef/ coastal waters; (ii) aquarium fisheries; (iii) institutional mandates; (iv) foreign fishing; (v) Vessel Monitoring System (VMS); (vi) improvement in the enforcement framework, *e.g.* measures with respect to registration and marking of vessels and (vii) legal framework for regulation of aquaculture.

An effective and implementable MCS are pre-requisite for management and conservation of fisheries resources in the Maldivian waters. In January 2008, the four member-countries (Bangladesh, India, Maldives, Sri Lanka) of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) organized a Regional Workshop on MCS (RW-MCS) in Chittagong, Bangladesh. One of the major outputs of the RW-MCS was the adoption of the 'Chittagong Resolution', which *inter alia* recommended that member-countries may undertake measures to formulate time bound action plans for ensuring successful implementation and also strengthening of the national agencies responsible for MCS.

2.0 The Proposed Workshop and its Justification

The main constraints, which impede practical application of MCS in marine fisheries in Maldives, have been identified as follows:

- Lack of licensing regime in the coastal fisheries zone to complement fishing vessel registration system;
- Lack of understanding among stakeholders on the need for MCS;
- Use of destructive fishing gear and methods;
- Misreporting of catch data;
- Harvesting of banned species and use of illegal fishing gear;
- Illegal fishing in prohibited areas;
- Poaching in the outer EEZ by foreign vessels;
- Illegal, Unreported and Unregulated (IUU) fishing;
- Concerns about potential over exploitation of some reef fish stocks;
- Inadequate human resources and assets for MCS; and
- Regional cooperation.

MCS in Maldivian waters presents a range of unique problems. In the given situation, some of the main controls and instruments that could be used in implementing MCS are:

(i) determining the level of sustainable exploitation and other relevant information by data gathering, assessment and analysis;

(ii) controlling (optimizing) fishing effort (*e.g.* through licensing), especially of reef fishery;

(iii) selecting appropriate management instruments to balance interest of the fishers and other sectors of the economy;

(iv) developing fisheries management plans based on the principles of conservation of fish stocks in a sustainable manner;

(v) enforcing controls in ports and at sea;

(vi) using VMS, wherever applicable and making it cost-effective;

(vii) educating the community through information dissemination;

(viii) promoting co-management strategies and devolving rights to communities;

(ix) providing legislative support for fishery management plans and regulations; and

(x) implementing regulations through licensing, reporting and enforcement of laws.

Another critical requirement for effective MCS is the establishment of a coordinating mechanism, with well-defined objectives and a clear work plan. It is seen that the Government cannot practice MCS in isolation and, therefore, coordination among stakeholders is essential. In this regard, an important approach to MCS in such fisheries is, whereever possible, to foster strong local awareness on the need for conservation and management. The setting up of MCS can also assist in establishment of multiple channels of communication, which can provide information to the fisher community on weather, commodity and market prices, safety aspects, hygiene, etc.

3.0 Objectives of the National Workshop

The main objective of implementing MCS is to secure responsible and sustainable management of fisheries resources in Maldives while allowing an ecologically safe and economically profitable exploitation of living marine resources in the interest of not only today's population but also for posterity. It is also expected to bring in a paradigm shift in the marine fisheries by promoting rights-based fisheries management. In essence, the proposed MCS will be the Government's instrument to achieve the goal set in its developmental plans.

The objectives of the National Workshop on MCS are as follows:

(i) Review of the existing fisheries management programmes (this will *inter alia* include registration of fishing vessels, number and category of fishing craft and gear, fishing harbours/ fishing landing sites, boat building yards, etc).

(ii) Review of the existing fishing vessel licensing and registration procedures and practices, fisheries legislations and of other concerned Ministries/ Departments having bearing on marine fisheries.

(iii) Assessment of the MCS capacity and identification of institutional development requirements within the MoFA and, if necessary, other concerned sister Ministries/ Departments/ Agencies.

(iv) Preparation of an outline of procedures and practical application of fisheries MCS programmes (the proposed Action Plan).

4.0 National Workshop

The National Workshop on MCS in Marine Fisheries will be organized by the BOBP-IGO in coordination with the MoFA, Government of Maldives. The Provisional Annotated Agenda and Timetable and Programme set up for the Workshop is attached.

Date and Venue

The National Workshop will be organized from 22-23 March, 2009 in Malé, Maldives.

Conduct of the Workshop

The National Workshop will be conducted in Dhivehi/ English.

Participation

Participants of the National Workshop shall include representatives from the (i) Ministry of Fisheries and Agriculture, (ii) Marine Research Centre, (iii) Maldives National Defence Force, (iv) Ministry of Transport and Communication, (v) Ministry of Economic Development and Trade, (vi) Maldives Customs Services, (vii) Maldives Industrial Fisheries Company Ltd., (viii) Representative of Fishing and Allied Industries, (ix) Representative of Fisher Association, (x) Representatives of Seafood Processor's Associations, (xi) Fishers and (xii) BOBP-IGO.

Format of the Workshop

The National Workshop shall include three lead presentations followed by Group Discussions and finalization of an action plan for consideration of the Government of Maldives. Copies of the presentations and other documents shall be distributed to the participants prior to the Workshop.

Coordination of Workshop

The Director, BOBP-IGO will coordinate the National Workshop arrangements in consultation with the MoFA, Government of Maldives.

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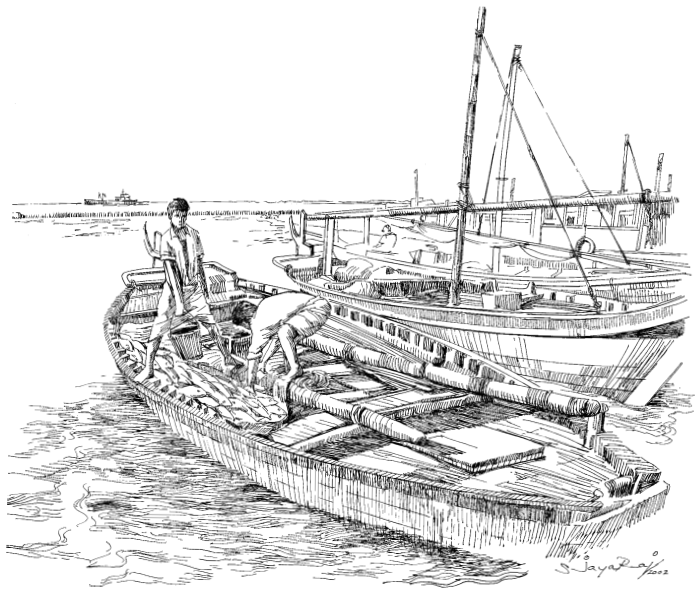
Agenda and Timetable

22 March 2009 (Sunday)	
0830 – 0900	Registration
0900 – 1000	Session I - Opening Session
1000 – 1030	*Tea/ Coffee Break & Group Photograph*
1030 – 1230	Session II - Presentation of Technical Papers
1230 – 1345	*Lunch Break*
1345 – 1530	Session III - Group Discussion
1515 – 1530	*Tea/ Coffee Break*
1530 – 1700	Session III contd…
23 March 2009 (Monday)	
0900 – 1100	Session IV - Group Presentation and Preparation of draft Action Plan
1100 – 1115	*Tea/ Coffee Break*
1115 – 1230	Technical Session IV contd…
1230 – 1400	*Lunch Break*
1400 – 1530	Session V - Concluding Session
1530 – 1600	*Tea/ Coffee/ Depature of Participants*



Programme

21 March 2009 (Saturday)	**Arrival of participants**
22 March 2009 (Sunday)	**Day 1**
0830 – 0900	*Registration*
0900 - 1000	**Session I: Opening of the National Workshop**
0900 - 0910	Recitation from Holy Qur'an
0910 - 0920	Introductory Remarks: Dr Yugraj Singh Yadava, Director, Bay of Bengal Programme Inter-Governmental Organisation.
0920 - 0930	Welcome Remarks: Dr Abdulla Naseer, Permanent Secretary, Ministry of Fisheries and Agriculture, Government of Maldives.
0930 – 0945	Address by the Chief Guest: Dr Hussain Rasheed Hassan, Minister of State for Fisheries and Agriculture, Government of Maldives.
0945-1000	Vote of Thanks: Mr Hussain Sinan, Senior Research Officer, Ministry of Fisheries and Agriculture, Government of Maldives.
1000 - 1030	*Group Photograph; Tea/ Coffee*
1030 – 1230	**Session II: Presentation of Technical Papers**
1030 - 1050	Monitoring, Control and Surveillance in Small-scale Fisheries –Guiding Principles and Practices - Dr Yugraj Singh Yadava
1050 - 1110	Legal Aspect of MCS in Maldives **-** Mr Hussain Sinan
1110 - 1130	Legal and Policy Support to Implement MCS in Maldives - Mr Adam Ziyad Fisheries Research Officer, Fisheries Management Unit, Ministry of Fisheries and Agriculture, Government of Maldives.
1130 - 1150	Status of Fishery in Maldives – Ms Shahaama A Sattar, Senior Research Officer, Marine Research Centre, Government of Maldives.
1150 - 1210	Status of Tuna Fishery in Maldives – Dr Shiham Adam, Director General, Marine Research Centre, Government of Maldives.
1210 - 1230	VMS in EEZ of Maldives - Maldives National Defence Force.
1230 – 1345	***Lunch***
1345 – 1700	**Session III: Group Discussion**
1345 -1400	Formation of Groups/ Orientation
1400 – 1515	Group discussion
1515 – 1530	*Tea/ Coffee*
1530 - 1700	Group discussion continued

23 March 2009 (Monday)	Day 2
0900 – 1230	**Session IV: Group Presentations and Preparation of Draft Action Plan**
0900 – 1100	Group presentations
1100 – 1115	*Tea/ Coffee*
1115 – 1230	Preparation of Draft Action Plan
1230 – 1400	***Lunch***
1400 – 1600	**Session V: Concluding Ceremony**
1400 – 1445	Presentation of Draft Action Plan and its Adoption
1445 – 1500	Concluding Remarks: Dr Ibrahim Didi, Minister of Fisheries and Agriculture
1500 – 1515	Vote of Thanks: Mr Hussain Sinan
1515 – 1530	Vote of Thanks: Dr Yugraj Yadava, Director, BOBP – IGO
1530 – 1600	*Tea/ Coffee*
1600 hrs onwards	***Participants departure***

List of Participants

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Sl No	Name	Address	Tel/ Fax/ Mobile/ Email
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22.0	**Ahmed Bunyaamin**	*President* Maldives Seafood Processor's Association	Tel: + 960 77 76 382
23.0	**Mohamed Azeem**	*General Manager* Maizan Electronics Gaadhoo Building, Boduthakurufaanu Magu, Henveyru, Malé Maldives	Tel: + 960 99 33 211
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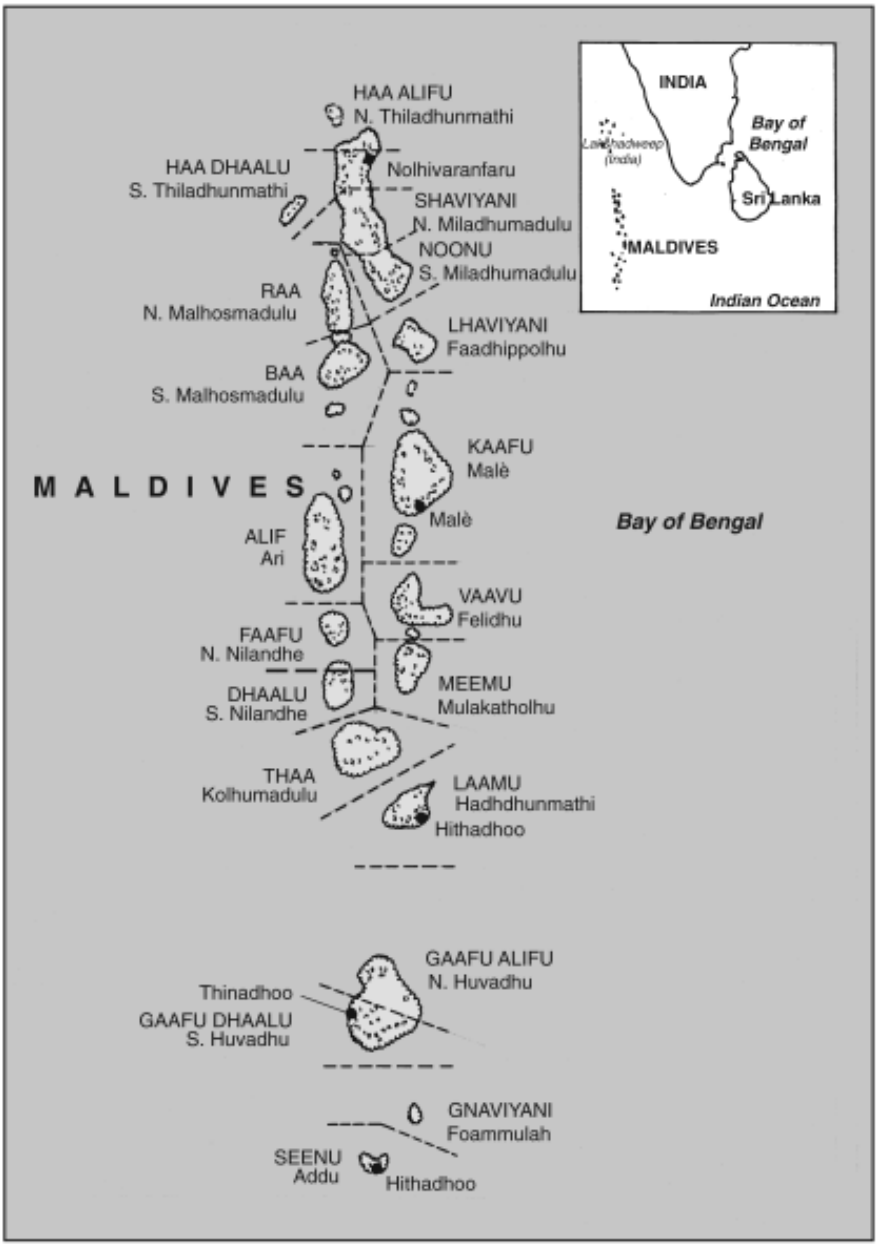

INDIA
Bay of Bengal
Lakshadweep (India)
Sri Lanka
MALDIVES
Indian Ocean
HAA ALIFU
N. Thiladhunmathi
HAA DHAALU
S. Thiladhunmathi
Nolhivaranfaru
SHAVIYANI
N. Miladhumadulu
NOONU
S. Miladhumadulu
RAA
N. Malhosmadulu
LHAVIYANI
Faadhippolhu
BAA
S. Malhosmadulu
KAAFU
Malè
M A L D I V E S
Malè
Bay of Bengal
ALIF
Ari
VAAVU
Felidhu
FAAFU
N. Nilandhe
MEEMU
Mulakatholhu
DHAALU
S. Nilandhe
THAA
Kolhumadulu
LAAMU
Hadhdhunmathi
Hithadhoo
GAAFU ALIFU
N. Huvadhu
Thinadhoo
GAAFU DHAALU
S. Huvadhu
GNAVIYANI
Foammulah
SEENU
Addu
Hithadhoo

Not to scale

Report

Introduction

1.0 A National Workshop on Monitoring Control and Surveillance (NW-MCS) was organized on 22 - 23 March 2009 in Malé, Maldives in pursuance of the Chittagong Resolution made by the member-countries of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) in January 2008 in Chittagong, Bangladesh. The major objective of the NW-MCS was to formulate an agreed Plan of Action for implementation of MCS in the Maldives. The NW-MCS was jointly organised by the Government of Maldives and the BOBP-IGO. 30 representatives from the Ministry of Fisheries and Agriculture (MoFA); Ministry of Economic Development; Ministry of Housing, Transport and Environment; Maldives National Defense Force; Maldives Customs Service; Maldives Police Service; Marine Research Centre; representatives of fisheries and allied industry and fisher's associations; fishers; and BOBP-IGO participated in the Workshop.

Opening Session

2.0 The Opening Session of the NW-MCS began with the recitation from the Holy Qur'an by Algaaree Ahmed Maumoon Muhaasiru Musaaidh. Dr Hussain Rasheed Hassan, Hon'ble Minister of State for Fisheries and Agriculture, Government of Maldives chaired the session. Dr Abdulla Naseer, Permanent Secretary, MoFA, Government of Maldives also attended the inaugural session.

3.0 Dr Y S Yadava welcomed the dignitaries and the delegates attending the NW-MCS and said that the suggestion for this Workshop came from the Regional Workshop on MCS (RW-MCS) held in Chittagong, Bangladesh during January 2008. He explained the objectives of the Workshop and said that good MCS leads to good governance of fishery resources and good governance of fishery resources leads to prosperity of the country. Dr Yadava said that for a traditional fishing nation like Maldives, it is very important to have an effective MCS to ensure food security and prosperity. He hoped that the two-day Workshop would be fruitful in analyzing the issues pertaining to the implementation of the MCS in Maldives and suggest practical solution to the problem. In conclusion, Dr Yadava thanked the Government of Maldives for their hospitality and support.

4.0 Dr Abdulla Naseer, Permanent Secretary, Ministry of Fisheries and Agriculture, Government of Maldives welcomed the delegates. Dr Naseer said that keeping in view the geographical peculiarities of Maldives, a sound MCS regime is highly essential. He recalled the successful outcome of the RW-MCS in Chittagong in January 2008 and re-affirmed his Ministry's resolve to meet the requirements of the Chittagong Resolution.

5.0 Dr Hassan, Hon'ble Minister of State for Fisheries and Agriculture delivered the inaugural speech. He welcomed the delegates and wished the Workshop success. Dr Hassan said that Illegal, Unreported and Unregulated (IUU) fishing was causing enormous damage to the global fisheries and a well-established MCS regime with cooperation from all concerned stakeholders can help reducing IUU fishing. He hoped that the NW-MCS will conclude with

an agreed Plan of Action for Maldives and assured his Ministry's full support to the implementation of the Plan of Action.

Technical presentations

6.0 Dr Y S Yadava made the first presentation on '***Monitoring, Control and Surveillance in Small-scale Fisheries – Guiding Principles and Practices'***. Presenting a snapshot of the Maldivian fisheries sector, Dr Yadava said that the importance of improving fisheries management stands vindicated from both ecological and economic grounds. He said that scope still exists in capacity expansion in Maldivian fisheries, but such expansion should be based on precautionary principles. The geographical realities of Maldives make implementation of MCS a challenging task. This situation also calls for institutional reforms and community mobilization for designing a cost-effective MCS regime in the Maldives", said Dr Yadava. He also detailed the formulation of a time-bound action Plan of Action for successful implementation of MCS and for strengthening of the agencies responsible for MCS in the country.

7.0 Dr Shiham Adam and Ms Shahaama A Sattar of the Marine Research Centre (MRC), Government of Maldives made a presentation on ***'The Status of Marine Fisheries in Maldives and its Preparedness for a Monitoring, Control and Surveillance Regime'.*** The presenters informed that as per the catch and effort data of Maldives, the country is yet to achieve Maximum Sustainable Yield (MSY) for all species. However, the situation varied from species to species. The tuna fishery is the mainstay of Maldivian fisheries and has been practiced since time immemorial. The traditional tuna fishery targets the skipjack, *Katsuwonus pelamis* and is carried out using pole and line. More recently, the contributions of reef fishery and the grouper fishery have also become prominent. The grouper fishery is export-market driven, while the reef fishery caters to the expanding tourism industry of Maldives. Sharks have also been targeted since the early days, although from 01 of March 2009, there has been a ban on the reef shark fishery. Dr Adam said that for tuna fishery, the decline in catches in 2007 and 2008 has raised concerns about the status of the stock. Stock assessments undertaken by the Indian Ocean Tuna Commission (IOTC) have shown that current Indian Ocean catches are more than the replacement yield of the stock. For skipjack, no assessment has been done. Dr Adam pointed out that it was important to undertake a fishing capacity assessment of the Maldivian fleet which will also be important for stock assessment and contribute to an effective MCS in the country.

8.0 Mr Hussain Sinan and Mr Adam Ziyad of MoFA presented a paper on ***'Legal Policy Support to Implement Monitoring, Control and Surveillance in Marine Fisheries Sector of Maldives: Present Status and Gaps to be addressed'.*** The speakers said that fisheries in Maldives largely depend on pole and line fishing for skipjack tuna, followed by hand lining and long lining for yellowfin and bigeye tuna. The Fisheries Act of Maldives (Act no: 5/87) is the major governing regulation. It empowers MoFA to establish and administer regulations for sustainable utilization and conservation of fish stocks and living marine resources, including threatened species. In addition, it lays down conditions for licensing of foreign vessels or joint ventures in the Exclusive Economic Zone (EEZ); provides for apprehension of vessels, arrests and penalties; and describes the Coastal Fishery Zone (CFZ) of the country. The MoFA is supported in the execution of its mandate by the Fisheries Advisory Board (FAB). The FAB comprises Ministers from the Ministry of Trade and Industry, Ministry of Tourism, Ministry of Defence and National Security Service, Ministry of Atoll and Island

Workshop participants engaged in Group Discussion

Administration, Ministry of Transport and Shipping, Maldives Customs Service, Ministry of Health and Ministry of Environment, Energy and Water.

Mr Sinan said that compliance is an important issue in fisheries management. The reasons for non-compliance are manifold: lack of awareness, inconsistencies in regulations issued by different ministries/departments, inadequate enforcement capacities, and the socio-cultural environment of small island communities that rely firmly on community cohesion and solidarity. Mr Sinan informed that a review under the FAO Fish Code Programme on all aspects of MCS, carried out in October 2000, found that a need existed to update the current Fisheries Act of 1987. Such an update could *inter alia* address: (i) protection of the interests of fishers *vis-à-vis* competing interests in reef/coastal waters; (ii) aquarium fisheries; (iii) institutional mandates; (iv) foreign fishing; (v) Vessel Monitoring System (VMS); (vi) improvement in the enforcement framework, *e.g.* measures with respect to registration and marking of vessels; and (vii) a legal framework for control of aquaculture.

Mr Sinan further informed that to strengthen MCS capacity, Maldives has implemented a Vessel Tracking System (VTS) for all vessels licensed to operate in the outer EEZ (the zone between 75 and 200 nautical miles). Established in 1995, the VTS is monitored by the Maldivian Coast Guard on a regular basis. The Coast Guard monitors the movement of licensed fishing vessels in the EEZ. This is done by installing necessary vessel-tracking transponder equipment on board the vessel — mandatory under the Fishing License Agreement between the Licensee and the Ministry of Economic Development and Trade. However, this system can identify only vessels with the programmed transponder. Frequent power failure and absence of written rules and regulations in operating the vessel transponder impair the efficacy of the system.

The two speakers also argued that in order to foster greater operational coordination, a MCS Operational Coordinating Committee of all the relevant ministries was essential. They also emphasized on the private sector participation, which needed encouragement. In conclusion, the speakers said that it was essential to foster international and regional cooperation to reduce MCS costs and also to collectively combat IUU fishing.

Group discussion and preparation Plan of Action

10.0 On completion of the technical presentations, three Working Groups were formed to discuss and make recommendations on the following issues:

> ***Group I: Review of existing institutions for MCS and institution building***
>
> ***Group II: Governance, policy and legislative support to MCS; and***
>
> ***Group III: Human resource development and role of non-governmental and community-based organizations.***

The details of the topics discussed in each group are given in ***Annexure I.*** The group-wise list of participants in each group is given in ***Annexure II.***

Recommendations from the Groups

11.0 The recommendations made by each group on the allotted topic are given in ***Annexure III-A-C.*** Mr Hussain Sinan presented the report for Group I. Dr Shiham Adam presented the report for Group II and Mr Adam Ziyad presented the report for Group III. Based on the recommendations of the three groups and discussion in the plenary, the Secretariat in association with MoFA and MRC prepared a Draft Plan of Action.

Closing Session

12.0 Hon'ble Minister of Fisheries and Agriculture, Government of Maldives Dr Ibrahim Didi; Hon'ble Minister of State for Fisheries and Agriculture, Government of Maldives Dr Hussain Rasheed Hassan along with other dignitaries attended the Closing Session.

13.0 The Session began with the presentation of the Draft National Plan of Action by Dr Shiham Adam. Dr Adam sought the approval of the house for its adoption, which was agreed to.

14.0 The National Plan of Action- MCS (NPOA-MCS) addresses the areas of resource estimation; estimation of fishing effort and adjustment of fishing capacity; registration and licensing of fishing vessels; infrastructure development; surveillance; review of fisheries legislation; fisheries policy and management frameworks; capacity building and empowerment; community mobilization; communication and awareness; and coordination and networking among the Ministries and regional cooperation.

The NPOA-MCS suggests that the monitoring and control aspect of the MCS system should be prepared in consultation with the Province Offices. The registration and licensing activities should also be assigned to the Provinces, who should implement them in consultation with MoFA. Further, the NPOA-MCS suggests incorporation of safety parameters before issuing licences to fishing boats to ensure fisher's safety at sea.

The NPOA-MCS proposed that stories of success (and also failures) in fisheries management, indigenous knowledge in fisheries management, etc could create awareness in enhancing fisheries conservation and management measures and should be documented and shared with fishers and other stakeholders. The Plan further recommended that the Maldives should become a full member in Regional Fisheries Management Organizations such as the Indian Ocean Tuna Commission to improve regional cooperation and curb IUU fishing in the Maldivian waters. It was also agreed to submit the NPOA-MCS to the MoFA, Government of Maldives for their consideration. The NPOA-MCS is presented in ***Annexure IV.***

15.0 Dr Ibrahim Didi, in his concluding remarks said that MCS in marine fisheries was crucial to the Maldivian economy and the economy of the region as a whole. Reviewing the role of BOBP-IGO, Dr Didi said the BOBP has been assisting Maldives for many years and the country complements its contributions. Dr Didi said that "we could do better only by thinking out of the box and looking into the future and in this regard I consider emerging surveillance technologies as crucial". He said that the country is looking at a future where there would be partnership between the private sector, research organizations and institutional investors as the country is moving away from state owned enterprises towards a New Maldives. He thanked the participants for their contributions to make the Workshop successful.

16.0 Mr Hussain Sinan, Senior Research Officer, MoFA delivered the vote of thanks. He thanked the participants for their contributions in making the NW-MCS successful and to BOBP-IGO for the technical support in organization of the Workshop in Maldives.

17.0 Dr Y S Yadava congratulated the participants for their active participation and contributions to the Workshop. He expressed his gratitude to the Government of Maldives for the excellent hospitality and whole-hearted support to make the Workshop successful.

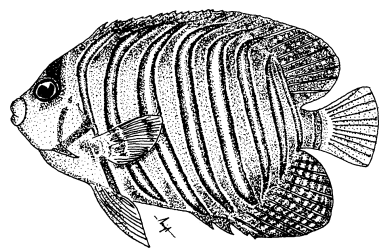
18.0 The Report of the NW-MCS was adopted on 23 March 2009.

* * *

Annexure I

List of Participants in Group Discussion

Group I: Review of existing institutions for MCS and institution building	Group II: Governance, policy and legislative support to MCS	Group III: Human resource development and role of non-governmental and community-based organizations
Hussain Sinan	Shiham Adam	Shahaama A Sattar
Abdulla Mohamed	Mohamed Shameem	Hussain Riffath
Aminath Shahida	Mohamed Azeem	Abdul Samad Abdulla
Athif Abdulla	Aassan Saud	Adam Ziyad
Mohamed Rasheed	Mohamed Hassan	Mohamed Hameed
Ibrahim Sahooq	Mohamed Fahmy	Mariyam Saleem
Hassan Shifan	Ahmed Shareef Hussain	
Abdulla Hameed Adam		



Annexure II

Details of topics discussed in each group

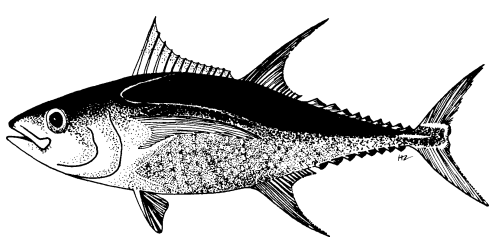
Sl No	Group I: Review of existing institutions for MCS and institution building	Group II: Governance, policy and legislative support to MCS	Group III: Human resource development and role of non-governmental and community-based organizations
1.0	Balancing fishing capacity with sustainable harvest limits to maximize revenue in coastal fishery and the EEZ;	Fisheries policy framework;	Institutions and their capacities in meeting the need of MCS System;
2.0	Review of information collection mechanism in terms of efficacy, cost and feedback mechanism;	Fisheries management framework;	Empowerment of Ministry of Fisheries & Agriculture to enforce MCS System;
3.0	Review of infrastructural needs, including communication;	Fisheries legislation and its applicability to meet the need of MCS System (Registration, licensing, zonation, etc.);	Training needs for establishment of MCS system;
4.0	Coordination amongst concerned Ministries and improvements needed, if any;	Existing legislation of other concerned Ministries and their applicability to meet the needs for MCS System;	Community mobilization and networking;
5.0	Information flow streamlining amongst the scientific community and fishers.	Analysis of fisheries in the EEZ;	Co-management of resources.
6.0	-	Regional cooperation.	-

Annexure III A

Summary of Group Discussion: Group I

Issue	Present status	Recommendation
Balancing of fishing capacity with sustainable harvest limit to maximize revenue in coastal fishery and the EEZ.	• Lack of a sound monitoring system for coastal fisheries and the fisheries taking place within the EEZ. • Poor execution of the current management regimes and lack of proper management and monitoring facilities. • Inadequate mechanism for proper inspection of the fishing vessels and the gear that is used by vessels that enter Maldivian waters (for innocent passage and fishing in EEZ) • Inefficiency of Coast Guard services. • No observer programmes for foreign vessels fishing in the EEZ. • Inadequate communication equipment in fishing vessels. • Substandard regulations for health and safety of fishers and fishing vessels. • Inexperienced skippers. • Lack of boat building code. • Poor catch reporting	• Establishment of a monitoring regime for coastal and offshore fisheries. Improving the system for statistics collection (species and numbers). Cancellation of fishing licenses for vessels that regularly misreport or fail to report. • Investments in better facilities and establishing such facilities at Province level across the country, including issuance of licenses and health certificates. • Advance information to fishers about foreign licensed fishing vessels entering Maldivian waters with other relevant information such as the channel that they would be passing through and their direction of travel. • Establishment of Coast Guard facilities across the country. • Deployment of observers from the local agent on all EEZ fishing vessels. • Establishment of a better and improved communication system that covers greater area than the current system and establishing communication stations at Province levels. • Changing the current system of issuing safety certificates for vessels according to their size, fishery and range of operation of the vessel. • Training skippers and deck hands to improve the use of modern facilities. • Establishment and enforcement of a boat building code using surveyors. • Controlling the distance that a fishing vessel could go out to fish according to the size of the fishing vessel.
Review of information collection mechanism in terms of efficacy, cost and feedback mechanism.	• Inadequate recording of details such as weight, size and species by fishers and fishing vessels. • Lack of trained staff in Island Offices. • Fishers ill informed about the importance of data collection and statistics.	• Immediate implementation of log book system for all vessels and fisheries. • Review of existing reporting mechanism to identify the issues and areas of improvement. • Making skippers or vessel owners responsible for reporting the catch and enforcing penalties for violations. • Use of trained staff for data collection in all the Islands.

Issue	Present status	Recommendation
	• Lack of trained staff in MoFA.	• Educating fishers about the importance of statistics in fisheries management. • Training of staff at MoFA.
Review of infrastructural needs, including communication.	• Lack of proper facilities. • Use of outdated communication facilities.	• Establishing buying and processing facilities for all commercial target species across the country. • Implementing an affordable communication system. • Informing the public about the importance of proper communication system.
Coordination amongst concerned Ministries and improvements needed, if any issues.	• Lack of coordination among government authorities.	• Regular meetings with fishers to discuss the issues and their solutions.
Information flow streamlining amongst the scientific community and fishers.	• Lack of awareness amongst fishers on new scientific findings and lack of trained technical staff to conduct research.	• Improving information dissemination system so as to inform the target audiences on new scientific findings and encouraging foreign scientists to conduct research in Maldives.



Annexure III B

Summary of Group Discussion: Group II

Issue	Recommendation
Fisheries policy and management framework.	• The work initiated for development of a *Fisheries Master Plan* should be completed. • The main policy framework should be developed based on discussions with relevant stakeholders. • Existing fisheries law should be amended in order to enhance the support needed in implementation of the *Fisheries Master Plan.* • The data collection system in the Ministry should be further improved and extra support should be given to enhance the monitoring component. • The Government should prepare **standard guidelines**, which should be implemented for all products including dried fish, fresh or chilled and frozen products. • A review of the status of the fisheries including stock levels, laws, regulations and agreements with companies should be undertaken prior to the development of a MCS programme. • Awareness drive should be carried out to make the public aware of the current trends in fisheries, responsible fisheries and the current methodologies used in fishing. This would facilitate new governance procedures.
Fisheries legislation and its applicability.	• The monitoring and control aspect of the MCS system should be prepared in consultation of the Provincial Offices. The registration and licensing mechanisms should also be facilitated from these offices. The Provincial Offices in conjunction with MoFA could implement the monitoring and control aspects. • The Government should review the existing laws based upon the new Constitution. The new Constitution specifies that penalties could only be imposed based upon the clauses stated in the laws. Hence, there are huge gaps in the current law, which need to be addressed. • The Government should facilitate in providing third party certification in order to differentiate between sustainable and environment- friendly fisheries and unsustainable fisheries. • The Government should also emphasise on implementing the current laws and regulations.
Existing legislation of other Ministries.	• The Maldives Food and Drug Authority (MFDA) should be an independent body to certify health standards and also to facilitate the services of MFDA at the Provincial offices. • There are conflicts in the mandates of the MoFA and the Ministry of Trade. Such conflicts should be addressed through discussions. • Maldives Coast Guard and the Marine Police should also reach to a consensus because of the conflicts in their laws. Presently, Coast Guard and Marine police are required to monitor and capture any illegal activity at sea.

Issue	Recommendation
Analysis of EEZ.	• Permits for new vessels should be stopped until a further review of the current legal framework for licensing in EEZ is undertaken. • In view of the increase in transshipment at sea, there should be restrictions on such activities. • Existing gaps in the current legal framework for licensing in EEZ should be examined and required action should be taken to address the gaps. • Special emphasis should be given to strengthen the reporting system from vessels operating in the EEZ.
Regional Cooperation.	• Maldives should become a full member of the IOTC instead of a cooperating member. • The country should look for regional cooperation in monitoring the EEZ. • There is also a need for regional cooperation in knowledge transfer, especially in the area of quality assurance, processing, packaging and value addition.

Annexure III C

Summary of Group Discussion: Group III

Issue	Recommendation
Institutions and their capacities in meeting the needs of MCS System and Empowerment of the Ministry of Fisheries & Agriculture to enforce the MCS System.	• A MCS Department should be set up in MoFA with separate section for each component (monitoring, control and surveillance). • There should be good cooperation and information exchange between the MCS Department, Maldives Coast Guard, Marine Police and other relevant agencies. • Illegal activities should be clearly defined by law with penalties for any breach instead of defining them under the regulations. • Control Centres should be developed in each Province. • Marine VHF communication system should be used in all fishing vessels instead of the CB sets used today. • All fishing vessels fishing outside the LFZ should use VHF system. • A dedicated vessel tracking system should be implemented for all EEZ fishing vessels.
Training needs for establishment of MCS System.	• Each control center should have trained technical staff. Such trained technical staff could be deployed to train the staff in the Provinces. • Mass awareness is needed to educate people on the activities that are detrimental to fish stocks and environment.

National Plan of Action for Implementation of Monitoring, Control and Surveillance in Marine Fisheries in Maldives

A. Resource Estimation

- Marine fish landings should be estimated regularly on the basis of a scientifically designed programme (*e.g.* introduction of the log book system). The monitoring of fish landings should include data on various biological aspects of commercially important species caught in the Maldivian waters.
- Stock assessment should be carried out at regular intervals. The revalidation of potential yield estimates should be conducted for commercially important fish stocks every five years. While arriving at management quantities, the data available with different agencies should also be taken into account.

B. Estimation of Fishing Effort and Adjustment of Fishing Capacity

- The fishing capacity should be estimated using scientific methods. Besides estimating the fleet size in absolute numbers, parameters such as gross tonnage and engine horse power should also be included.
- The deployment of fishing capacity should be commensurate with the productivity of the stocks.
- Adjustment of fishing capacity should be undertaken on a regular basis for the coastal waters and also for the Exclusive Economic Zone (EEZ).

C. Registration and Licensing of Fishing Vessels

- Monitoring and control aspect of the MCS system should be prepared in consultation with the Provincial Offices. The registration and licensing activities should also be assigned to the Provinces, who should implement them in consultation with the Ministry of Fisheries and Agriculture (MoFA).
- The requirements for issuing a licence should aim at meeting guidelines for design, construction and equipment of fishing vessels; area of operation; type of fishing; insurance for both vessel and crew; minimum safety equipment; reporting as provided for in the law and minimum requirements for working and living conditions as appropriate for different classes of vessels.
- New permits for fishing in the EEZ should be stopped until the current legal framework for licensing in the EEZ is reviewed and the gaps are adequately addressed. The mid-sea transshipments should also be stopped until such review is complete. All foreign fishing vessels permitted to fish under the existing arrangements must abide by the terms and conditions stipulated in the agreement such as reporting of catch, arrival and departure from the EEZ, etc. All violations by such vessels should be dealt strictly.
- The provisions of MCS should be adequately reflected in the fishing agreements with private sector.

D. Infrastructure Development

- The existing fisheries infrastructure facilities in terms of landing and berthing facilities (such as fishing harbours and fish landing centres), ice plants, cold storages, fish markets, boat building yards, communication facilities, etc should be inventorised.
- A thorough assessment of the existing infrastructure facilities and the actual requirements in terms of new units and or modernization of the existing facilities should be made. While doing so, the requirements of the newly created Provinces should be given priority.
- Considering the need to minimize post-harvest losses and to improve hygienic handling of fish at the fishing harbours and the fish landing centres, the concerned agencies operating the facilities should adopt and implement hygienic standards so as to conform to international standards for food safety.

E. Surveillance

- The Maldivian Coast Guard (under the Maldives National Defence Force) is the key agency for surveillance. To ensure that the important task of surveillance is carried out properly, the Coast Guard should be strengthened, both in terms of manpower and wherewithal. Therefore, it is essential that a comprehensive surveillance mechanism be evolved, which is practical and cost-effective.
- Surveillance should also be carried out at ports through random inspections by the designated agencies. This should be supplemented through the observer programme as mandated in the access agreements.
- A MCS Department should be set up at the MoFA with separate sections attending to monitoring, control and surveillance aspects.
- Effective implementation of MCS will also require setting up of a Central Control Center, with separate Control Centres for each Province. The Control Centers should be adequately staffed with trained technical manpower.
- All vessels fishing within 75 nautical mile zone should have marine VHF communication system instead of the CB sets presently used. It should be mandatory for all vessels fishing beyond this zone to be fitted with HF communication.
- A dedicated vessel tracking system should be implemented for all fishing vessels in the EEZ, including an Automatic Vessel Identification System.
- The involvement of stakeholders (*e.g.* fishers) is crucial for effective surveillance both at port and at sea. Emphasis may be laid on shore-based MCS programmes with greater community-participation.

F. Review of Fisheries Legislation

- The regulations under the new Fisheries Law (once the Bill is ratified) should include provisions for a master plan, MCS, fisheries management (inclusive of safety requirements) and resource conservation. Such legislation should not only be compatible with the provisions of the new Constitution of the country but also be compatible with the International voluntary and non-voluntary instruments (*e.g.* the 1982 United Nations Convention on the Law of the Sea, the United Nations Fish Stocks Agreement, the 1995 Code of Conduct for Responsible Fisheries, IMO/ FAO/ ILO Voluntary codes for fishing vessels Part A and B).

- Definitions of illegal activities have to be part of the main law rather than defining them in the regulations. The law should also have provisions for penalty for violations.

G. Fisheries Policy and Management Frameworks

- The Master Plan for the Fisheries Sector should be finalized. The Plan should be comprehensive and should clearly define the objectives and goals of fisheries development. The Master Plan should be finalized in consultation with the stakeholders and should ensure decentralization and adopt the '*Principle of Subsidiarity'*. Further, such Plan should be dynamic in nature and allow for periodic revisions and adoption of new developments to assist in sustainable growth of the fisheries sector.
- The Master Plan should have provisions for management plans for major fish stocks to ensure their exploitation on sustainable basis. In a data-deficient situation, such plans may also rely on the 'precautionary approach'. Further, augmentation of research support may also be necessary for formulation of management plans and additional budgeting support may be considered for the purpose.
- Adequate provision of funds for implementation of MCS and other fisheries management measures is a pre-requisite. It must be ensured that adequate budgetary provisions are made to cover the requirements of logistics, manpower, surveillance, human resource development, etc.
- Safety, like MCS, is also an integral part of fisheries management. Development of management plans for fish stocks should take into account the safety of fishers and ensure that such plans do not put the fishers at risk.
- Effective fisheries management programmes should aim at minimizing post-harvest losses and ensuring that the harvested resources are available as food fish to the people and also put to other productive uses.
- The Government should facilitate providing third party certification in order to differentiate between sustainable and environmentally-friendly fisheries and unsustainable fisheries.

H. Capacity Building and Empowerment

- The capacity building of the staff of MoFA and other concerned organizations should be initiated in a planned manner. A Gap analysis may be undertaken to arrive at the actual needs of capacity building in all spheres of fisheries management in general and MCS in particular.
- Similarly, strengthening of the fisheries institution(s) and other agencies concerned with the implementation of fisheries management (*e.g.* community-based organizations) should be taken up in a time-bound manner.
- The Maldives Food and Drug Authority (MFDA) should function as an independent body to certify health standards and also to facilitate the services of MFDA at the Province offices.
- The government should prepare standard guidelines covering all fish and fish products.
- The fishing community, as the grassroots practitioners of fisheries, should be empowered to participate in the fisheries management programmes. Their skills and capacities should be enhanced through short-term and highly focused vocational trainings and hands-on workshops.
- The socio-economic well being of fisher community should be improved. Besides strengthening their safety nets, the working and living conditions of fishers on board fishing vessels should also be improved.

I. Community Mobilisation, Communication and Awareness

- Fisher communities should be mobilized to participate and assist in the formulation of fisheries policies and implementation of fisheries management programmes. To accomplish this, capacity building of the fishers in all aspects of fisheries management needs to be taken up.
- The skippers and boat owners should also be vested with the responsibility of submitting catch/ effort data.
- Fisher cooperative should be strengthened and co-management should be promoted to facilitate the process at the grassroots level.
- Community interaction programmes should be undertaken on issues such as resource management and formulation of management plans, MCS, safety and survival, health, hygiene and literacy. Women must be included in such programmes and activities may also be conceived for them to participate in MCS programmes.
- The print and electronic media should be made use to the fullest extent in educating fishers and other stakeholders on the need for fisheries data and its reliable reporting, which is an important input for effective fisheries management. The mass media should also be used for building the capacity of the stakeholders.
- There is a greater need for information collection, collation and dissemination. Stories of success (and also failures) in fisheries management, indigenous knowledge in fisheries management, etc can enhance fisheries conservation and management measures and should be documented and shared with fishers and other stakeholders. Students and public personalities should also be involved in the exercise. Fullest use of information technology and Geographical Information System should be made.

J. Coordination and Networking

- Formal and effective linkages should be established between the key players – Ministry of Fisheries and Agriculture/ Ministry of Housing, Transport and Environment/ Ministry of Defence and National Security/ Ministry of Trade/ Ministry of Communication and Civil Aviation/ Ministry of Home Affairs (Provincial Administration) for improved implementation of the fisheries management programmes in general and MCS activities in particular. The existing difference, if any, in their mandates, laws, etc should be resolved. Similarly, the Maldives Coast Guard and the Marine Police also need a coordinated approach for monitoring the activities at sea.
- The Fisheries Advisory Board under the MoFA should play the important role of a coordinating agency on the implementation of the approved action plan and also monitor the progress through performance indicators.

K. Regional Cooperation

- Regional cooperation should be promoted for monitoring the EEZ and also in knowledge transfer, especially in the area of quality assurance, processing, packaging and value addition.
- Maldives should also participate as full member in Regional Fisheries Management Organizations such as the Indian Ocean Tuna Commission.

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GoM/BOBP-IGO National Workshop on Monitoring, Control and Surveillance in Marine Fisheries – Maldives
Malé, Maldives, 22-23 March 2009

Monitoring, Control and Surveillance in Small-scale Fisheries – Guiding Principles and Practices

Yugraj Singh Yadava[1]

1.0 Rationale

Ever since the first major debate on the sustainability of global fish stocks in Mexico in 1992[2], the principles of sustainable management are now part of the policies of most of the coastal states in the world. However, in practice, the biological argument for fisheries sustainability is often lost in the economic considerations. Implementation of effective fisheries management is also a costly affair, both in terms of money, human resources and material. The result, as highlighted by the Food and Agriculture Organization's (FAO) report on the 'State of World Fisheries and Aquaculture (2008)' shows[3] that the proportion of underexploited or moderately exploited fish stocks has declined steadily from 40 percent in mid 1970s to 20 percent in 2007. Most of the stocks of the top ten species, which account for about 30 percent of the world's marine capture fisheries production in terms of quantity, are fully exploited or overexploited and, therefore, cannot be expected to produce major increases in catches. The percentage of stocks fully exploited, overexploited or depleted varies greatly by area. The major fishing areas with the highest proportions (71-80 %) of fully exploited stocks are the Northeast Atlantic, Western Indian Ocean and the Northwest Pacific.

It would not have been a concern if we had reached this stage by a rational effort formulated on the basis of precautionary principles. However, the present state of fisheries resource is rather due to myopic exploitation and uncontrolled greed by most of the key players. According to a World Bank study (2008)[4], this short-sightedness and greed has contributed to an accumulated loss of about 2 trillion dollars since 1970s. While the major emphasis of the report is on over capacity – as is the global trend, the situation may vary at individual level. In micro-terms, the message of the report may be interpreted as that for natural capital like fishery, the states should take at least as much measure as individuals take when they invest their money. For example in case of tuna fishery, the FAO[5] cautioned that some stocks of skipjack tuna (*Katsuwonus pelamis*) are fully exploited while some are still reported as moderately exploited, particularly in the Pacific and Indian Oceans, where they could offer some limited possibilities for further expansion of fisheries production. However, this may not be desirable as it is nearly impossible to increase skipjack catches without negatively affecting bigeye and yellowfin tunas.

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[1] *Director, Bay of Bengal Programme Inter-Governmental Organisation.*

[2] *International Conference on Responsible Fishing held in Cancun, Mexico in May 1992 followed by the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Mexico in June 1992.*

[3] *"The State of World Fisheries and Aquaculture 2008", Part 1 World Review of Fisheries and Aquaculture, FAO, 2009.*

[4] *'The Sunken Billions: The Economic Justification for Fisheries Reform' can be downloaded from http://go.worldbank.org/MGUTHSY7U0*

[5] *The State of World Fisheries and Aquaculture 2008, Page 33.*

2.0 Methodological issues

2.1 Fisheries governance

Efficient fisheries governance rests on a judicious mix of both biological and economic-political considerations. Over time fisheries governance has evolved from passive state control to active state control. In the earlier days, marked by low level of technology, localized markets and hence low level of penetration was complemented by a passive state whose role was mostly limited to collection of taxes and port duties. In those days, Monitoring, Control and Surveillance (MCS) was simply policing or surveillance. However, the modern state, owing to rapid development of fisheries technology, globalized market and resultant constraint on isolated communities to effectively govern fisheries resources has changed to active role, where every aspect of fisheries production virtually need state's sanction. In this active state, MCS has emerged both as a planning and policing tool. However, as research shows, alienation of fishing communities from fisheries governance more often lead to governance failure and increases the cost of implementation. The direction of fisheries governance is now towards inclusive governance where community and market-based instruments (like quota) are gaining importance. In this changing regime, a MCS system is also expected to play a crucial role in reduction of transaction costs and upholding of rights.

2.2 MCS in context

MCS is recognized as an important component of fisheries management and also a key stepping stone for effective governance. MCS is vital for collecting data on basic attributes of fisheries *i.e.* its biological, technical, economic and social aspects. It plays an important role in day-to-day management involving government, fisher community and the industry. According to the 1981 FAO Expert Consultation[6] , the following definitions for MCS were adopted. These three inter-related activities were defined as:

- ***Monitoring*** – the continuous requirement for the measurement of fishing effort characteristics and resource yields.
- ***Control*** – the regulatory conditions under which the exploitation of the resource may be conducted.
- ***Surveillance*** – the degree and types of observations required to maintain compliance with the regulatory controls imposed on fishing activities.

The operation of any MCS regime will be based on the domestic legal arrangements in place in each country. Legislation is crucial because a legal basis is essential to allow and facilitate effective implementation of fisheries management measures as well as for successful implementation of MCS operations.

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[6] *FAO, 1981. Report of an Expert Consultation on Monitoring, Control and Surveillance Systems for Fisheries Management. FAO Report FAO/GCP/INT/344/NOR.*

2.3 Defining small-scale and artisanal fisheries

The FAO has defined small-scale fisheries (SSF) as:

"A term of English origin with a technological foundation. It tends to imply the use of a relatively small size gear and vessel. The term has sometimes the added connotation of low levels of technology and capital investment per fisher although that may not always be the case.[7]"

On the other hand, artisanal fisheries (AF) is defined as[8]:

"Traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips, close to shore, mainly for local consumption. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. They are sometimes referred to as small-scale fisheries".

However, as can be seen this definition is neither conclusive nor universal. The line separating small subsistence, small commercial and large-scale producers are often arbitrary. What is considered small-scale in one country or region may be considered large-scale in another.

On the other hand, whether a particular fishery is small-scale or not often stems from associated policies. In general, the SSF enjoys various facilities like subsidy and protection within the World Trade Organisation (WTO) framework. The WTO has mentioned a set of scales that may define AF or small-scale subsistence fishery. It is also generally agreed in the WTO that the AF can be given special facilities at the discretion of the concerned country.

Maldives is presently having a transitional fishing fleet. While, traditional fishery is still visible, most of the effort in Maldivian fishery is now coming from bigger boats which are often large (> 24 m). With the rapid increase in the capacity of fishing crafts and their changing nature, the methodological issue as relevant to Maldives is distinguishing these fleet on the basis of their area of operation and capacity. Commonly, increasing size brings additional rights and duties for a fishing craft. Thus for Maldives, it is also necessary to scrutinize if existing Laws and legal measures are well-coordinated with this growing fleet size.

3.0 Fisheries sector in Maldives[9]

A nation's fish stock constitutes its national wealth. In general, for the coastal states and particularly in the case of Maldives, judicious utilization of this wealth is of paramount importance. Maldives is an archipelago of nearly 1 200 coral islands grouped into 19 widely dispersed atolls covering an area of nearly 90 000 km^2 in the centre of the Indian Ocean. The country's Exclusive Economic Zone (EEZ) covers an area of nearly one million km^2.

[7] http://www.fao.org/fi/glossary/default.asp

[8] *ibid*

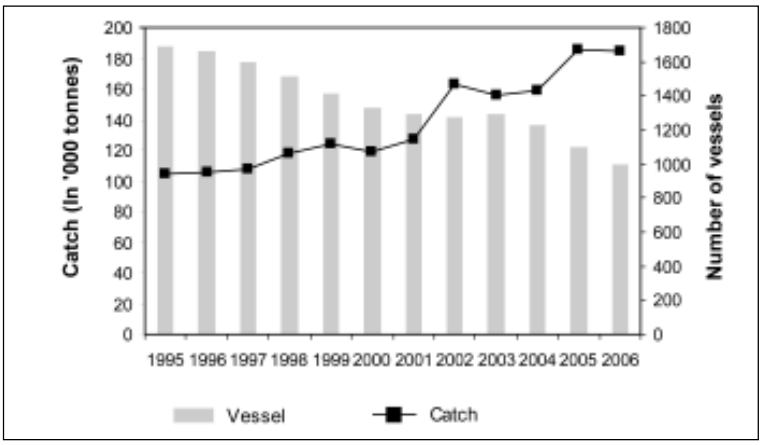
[9] *Data source for this section: Statistical Yearbook of Maldives 2008 retrieved from http://planning.gov.mv/yearbook2008/*

Marine resources are the country's main natural endowment with economic activities concentrated on fishing and tourism. Currently fisheries account for 4.72 percent of GDP (at constant prices in 2008), 7.61 percent of employment (2006 Census) and 98 percent of the country's export commodities (in value terms - 2007).

Although fishing industry employs the sixth highest number of persons at the national level, it remains the third major economic activity in the atolls, providing livelihood for the majority of the atoll population. Among the males in the atolls, it employs the second highest numbers (19% of employed males) coming next to tourism. Fishing industry in the country operates as small-scale informal sector economic activity. Majority of the fishermen (88%) have no fixed location of work as they operate from the fishing vessels out at sea. Over a third of the fishermen (36%) operate as group workers, around one fourth as own-account workers and contributing family workers. Only 16% of the fishermen work as employees. Other primary industries: agriculture and sand mining also comprise similar characteristics in terms of their informal nature of operation[10].

Capture fisheries in Maldives have grown rapidly since 1980s. However, the growth has not been smooth. It has increased from (in '000 mt) 127.2 in 2001 to 163.4 in 2002 and 184.2 in 2006 while in between it has declined to 155.4 in 2003 and 143.6 in 2007. Pole and line fishing contributes 86 percent of the total landings in Maldives (1 24 010 mt of 1 43 597 mt in 2007). Within pole and line fishing, skipjack fishery constitutes 77 percent of the catch, yellow fin tuna constitutes 11 percent and other marine fishes constitute about 7 percent of the catch.

Figure 1: Catch-effort dynamics in Maldives, 1995-2008



[10] *Quoted from Census Analysis, 2006 - Labour force and Employment - Ministry of Planning and National Development, Analytical Report, 2006 (http://planning.gov.mv/en/images/stories/publications/analysiscd/index.html)*

Fishing vessels in Maldives can be categorized into six types: mechanized Masdhoni, sailing Masdhoni, mechanized Vadhu, sailing Vadhu, trolling vessels and rowing boats. At present, mechanized Masdhonis constitutes 91percent of engaged vessels. Trolling vessels are almost out of use. The number of trips made by the mechanized Masdhonis has also come down from 1 89 941 in 2005 to 1 72 025 trips in 2007. On the other hand, between 2005 and 2007, the catch per unit of effort (CPUE) has increased from 948 kg to 1 622 kg for Masdhoni and from 91 kg to 230 kg for sailing Masdhonis. Overall, the average CPUE has increased from 273 kgs for all boats to 522.4 kgs for all boats during 2005-2007 – that is an increase of 91 percent (***Figure 1***). The highest increase in CPUE is observed in rowing boats (222%) and sailing Masdhonis (153%).

3.1 Issues in Management

Maldives fishery has reached the trajectory where it can either move into a sustainable path or as a short-lived bubble. The National Development Plan, 2006-2010 of Maldives[11] delineated 8 policies for the development of fisheries sector in the country:

Policy 1: Support diversification of fish harvesting and post-harvest industry to reduce economic vulnerability to external shocks and ensure Maldivian competitiveness in international markets;

Policy 2: Encourage and continue investments in the skipjack industry to optimize economic and social benefits from the industry;

Policy 3: Support and facilitate the establishment and development of a mariculture industry;

Policy 4: Continue restructuring of the sector to ensure optimal location of future investments and improve the balance between catching and processing capacity;

Policy 5: Increase human resource capacity to support sector development and diversification;

Policy 6: Ensure sustainable socio-economic development of fishing communities to maximize social and economic benefits;

Policy 7: Strengthen and expand research capacity to broaden our knowledge base for effective development and management of the marine resources;

Policy 8: Ensure sustainable management of marine resources for the benefit of present and future generations.

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[11] *Ministry of Planning and National Development, 2007 (pages 60-63) (retrieved from http://www.planning.gov.mv/en/)*

As is can be seen from the above policies, Maldives will continue to exploit its natural advantage of being a tuna-fishing nation. However, there is also a conscious effort to develop alternatives in the form of mariculture and food processing to ease the fishing pressure. Further, in the strategies developed under these policies, the nation is also planning to develop and implement a national MCS program to strengthen resource management.

Further, as mentioned earlier, scope does exist for expansion of tuna fishery. However, uncontrolled expansion without a precautionary approach may lead to catastrophe. At the same time, the country neither can afford nor should afford forgoing sustainable maximum catch from tuna fishery. As an observor member of IOTC, Maldives may need to work closely with the neighboring states to develop an exploitation path that does not undermine sustainability or poses risk of preying on each other.

4.0 Implementation of MCS in Maldives

The Fisheries Law of Maldives, 1987 is the governing law in the fisheries sector. As per the law, the EEZ of the country is specified. The Law empowers the Ministry of Fisheries and Agriculture (MoFA) to regulate and develop the fisheries sector. Other applicable laws include the Ocean Territories Act (Act No. 6/96), Environment Protection and Preservation Act (Act No. 4/93), and other laws, decrees, and regulations relating to the use of the EEZ, fisheries, environment, business, foreign investment, and so on.

In October 2000, as part of the FAO FishCode Programme, an expert mission reviewed aspects of MCS in Maldives. The MCS review evidenced the need to update the current Fisheries Act of 1987 to address, *inter alia*: (i) protection of the interests of fishers *vis-à-vis* competing interests in the reef/coastal waters; (ii) aquarium fisheries; (iii) institutional mandates; (iv) foreign fishing; (v) Vessel Monitoring System (VMS); (vi) improvement in the enforcement framework, *e.g.* measures with respect to registration and marking of vessels and (vii) legal framework for regulation of aquaculture.

The main constraints, which impede practical application of MCS in Maldives, have been identified as follows:

- Lack of a licensing regime in the coastal fisheries zone to complement the fishing vessel registration system;
- Lack of understanding among stakeholders on the need of MCS;
- Use of destructive fishing gear and methods;
- Misreporting of catch data;
- Harvesting of banned species, and use of illegal fishing gear;
- Fishing in prohibited areas;
- Poaching in the outer EEZ by foreign vessels;
- IUU fishing;
- Concern about potential over exploitation of some reef fish stocks;
- Inadequate human resources and assets for MCS; and
- Regional cooperation.

MCS in Maldivian waters presents a range of unique problems. In the given situation, some of the main controls and instruments that could be used in implementing MCS are:

- determining the level of sustainable exploitation and other relevant information by data gathering, assessment and analysis;
- controlling (optimizing) fishing effort (*e.g.* through licensing), especially of reef fishery;
- selecting appropriate management instruments to balance interest of fishers and other sectors;
- developing fisheries management plans based on the principles of conservation of fish stocks in a sustainable manner;
- enforcing controls in ports and at sea;
- using VMS, wherever applicable;
- educating the community through information dissemination;
- promoting co-management strategies and devolving rights to communities;
- providing legislative support for fishery management plans and regulations to ensure equitable allocation of resources; and
- implementing regulations through licensing, reporting and enforcement of laws.

Another critical requirement for effective MCS is the establishment of a coordinating mechanism, with well-defined objectives and a clear work plan. The Government cannot practice MCS in isolation and, therefore, coordination among stakeholders is essential. In this regard, an important approach to MCS in such fisheries is, where possible, to foster a strong local awareness on the need for conservation and management. The setting up of MCS can also assist in establishment of multiple channels of communication, which can provide information to the fisher community on weather, commodity and market prices, safety at sea aspects, hygiene, etc.

Therefore, any MCS programme will have a focus on the interaction between control and management of fisheries since control is not an end in itself but an essential corollary of

optimization of resource utilization subject to sustainability and management measures. In essence, the proposed MCS will be the Government's response to opportunities and challenges embedded in the fisheries sector of the country.

5.0 The Plan of Action

In January 2008, the four member-countries (Bangladesh, India, Maldives, and Sri Lanka) of the Bay of Bengal Programme Inter-Governmental Organisation along with experts met in Chittagong, Bangladesh to discuss implementation of the MCS within their national jurisdictions as also on a regional basis. At the end of the three-day Workshop, the member-countries agreed on a common agenda, which is known as 'Chittagong Resolution' and is attached as Annexure. The Resolution *inter alia* recommended that 'member-countries undertake measures to formulate time-bound action plans for successful implementation of MCS and for strengthening the national agencies responsible for MCS'. In view of the 'Chittagong Resolution', one of the objectives of this National Workshop is also to formulate 'a plan of action', which can guide the development of MCS in the country.

The main objective of implementing MCS in Maldives should be to secure responsible and sustainable management of fisheries resources while allowing an ecologically safe and economically profitable exploitation of living marine resources in the interest not only of today's population but also for posterity. The objective should also aim at bringing in a paradigm shift in the marine fisheries sector from open access to limited and controlled access regime and wherever possible allocating rights to the user groups.

While it is recognized that there are no unique solutions to the design and implementations of MCS system, the action plan, based on common principles and goals, will endeavour to meet the specific requirements of the objectives of the Fisheries Policy of the Government of Maldives and local culture and customs. The proposed framework of the plan of action is suggested as follows:

(i) Review of existing marine fisheries management programmes and analysis of fisheries in the territorial waters and the EEZ (this will inter alia include registration of fishing vessels, number and category of fishing craft and gear, fishing harbours/ fishing landing sites, boat building yards, etc);

(ii) Review of the existing fishing vessel licensing and registration procedures and practices, fisheries legislations and of other concerned Ministries/ Departments (e.g. Ministry of Transport and Shipping);

(iii) Assessment of the MCS capacity and identification of institutional development requirements within the MoFA, and, if necessary, other concerned sister Departments;

(iv) Creation of a MCS Unit in the MoFA;

(v) Preparation of an outline of procedures and practical application of fisheries MCS programme and its implementation on pilot basis (in one or two manageable sites);

(vi) Organisation of community groups at the selected sites and their orientation for participation in the MCS;

(vii) Training of core MoFA/ Coast Guard staff in MCS;

(viii) Organisation of hand-on workshops for the stakeholders; and

(ix) Development of manual/ guidelines essential for the implementation of MCS.

6.0 Conclusion

In Maldives, the fisheries sector forms an important source of livelihoods. In the absence of other viable economic opportunities for the Islanders, the sector becomes even more important for the nation's economy and food supply. Therefore, the ultimate objective of MCS in Maldives should not be to only protect the resource but also to stabilize the sector, minimize occupational hazards and optimize policy benefits. A sound MCS regime in Maldives can offer a package of immediate benefits through (i) effective demarcation of fishing areas, (ii) better insurance deal from data strengthening, (iii) target fishing through resource mapping, (iv) sea-safety, (v) reflecting their stakes in fishing policy, (vi) stabilization of catch per boat hence income and (vii) possible jobs in land and sea-based monitoring systems. Implementation of MCS will also be a step forward in the fulfilment of the requirements of the Code of Conduct for Responsible Fisheries by Maldives.

As mentioned earlier, community motivation can help in making MCS cost-effective as also improve compliance of the rules and regulations. It may be a wise strategy to promote MCS as a business-strengthening package, which could be more appealing and effective in community mobilization for successful implementation of MCS in Maldives.

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Annexure

The Chittagong Resolution

Conscious that the marine fisheries sector is highly important for the economies of member-countries of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO);

Recognizing that the marine fisheries sector is a major contributor to the livelihoods, food and nutritional security and foreign exchange earnings of member-countries;

Realizing that a high percentage of the world's artisanal fisheries and small-scale fisheries are concentrated in South Asia, where many of the coastal stocks are almost fully exploited;

Recognizing that the marine fisheries sector largely operates in an open-access regime, and that the present condition of fisheries is largely attributable to weaknesses in the institutional and regulatory environment, a declining resource base and poor socio-economic conditions;

Realizing that monitoring, control and surveillance (MCS) regimes are weak in the marine fisheries sector of member-countries;

Concerned about the social and political constraints in regulating access to marine fisheries and in optimizing the fishing fleet;

Concerned that the current fisheries management regime for coastal fisheries in the region may lead to further unsustainable levels of exploitation of fisheries resources, and thereby impact the livelihoods of small-scale fishermen;

Concerned that the supporting regulations and policy framework relevant to the needs of MCS for small-scale fisheries, remain inadequately addressed by fisheries and maritime administrations in the sector;

Recognizing the limitations in institutional capacity of fisheries and maritime administrations in the region to undertake all responsibilities associated with the mandate;

Recognizing that the 1995 Code of Conduct for Responsible Fisheries (CCRF) of the FAO does not adequately address the need and requirements of MCS in marine fisheries;

Emphasizing the urgent need to address the multi-dimensional issue of MCS for small-scale fishermen in a holistic manner; and

Recognizing that the problem is not insurmountable;

We, the representatives of Fisheries and Maritime Administrations, Coast Guard and Fishermen's Associations, nominated by the Governments of Bangladesh, India, the Maldives and Sri Lanka, having participated in the BOBP -IGO Regional Workshop on Monitoring, Control and Surveillance for Small-scale Fisheries held in Chittagong, People's Republic of Bangladesh, from 16 -18 January 2008, now therefore:

Resolve to address, as a matter of urgency, the issue of MCS for small-scale fisheries;

Recommend that MCS requirements be comprehensively integrated into every member-country's fisheries policy and regulatory and managerial frameworks. This would include associated commitments under the CCRF and other regional, inter-regional or global instruments and initiatives;

Emphasize the need to rationalize institutional mandates and inter-sectoral cooperation at the national level, in order to enhance implementation of MCS in small-scale fisheries;

Recommend that fisheries and maritime administrations enhance their knowledge and database on the health of the fish stocks and on commensurate efforts required to harvest resources in a sustainable manner;

Recommend the development and implementation of education, training and awareness programmes which satisfy and promote MCS requirements;

Recommend that mandatory requirements for improving implementation of MCS be supplemented by other strategies which involve the participation of fisher communities, families, the media and other stakeholders in order to promote the adoption of a wide range of MCS measures;

Recommend that member-countries, while implementing MCS, also undertake measures to enhance the economic viability of small-scale fishing enterprises, as an essential element of the marine fisheries sector;

Recommend that member-countries make full use of the available technologies, including Vessel Monitoring System wherever feasible, in support of MCS;

Recommend that member-countries employ innovative measures such as co-management. This will be an effective cost-sharing measure for MCS and enhance the participation of fishers and other stakeholders in the management of marine fisheries resources;

Recommend that member-countries undertake measures to formulate time-bound action plans for successful implementation of MCS and for strengthening the national agencies responsible for MCS;

Recommend that member-countries undertake measures directed towards regional cooperation in ensuring successful implementation of MCS; and

Strongly recommend the formation and implementation of a regional MCS programme, employing a consultative and participatory approach, building upon institutionally derived data and the operational experience of small-scale fishermen.

Adopted on Friday, 18th January 2008 in Chittagong, Bangladesh.

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GoM/BOBP-IGO National Workshop on Monitoring, Control and Surveillance in Marine Fisheries – Maldives
Malé, Maldives, 22-23 March 2009

Legal and Policy Support to Implement Monitoring, Control and Surveillance in Marine Fisheries Sector of Maldives: Present Status and Gaps

Hussein Sinan[1]

1.0 Introduction

The Maldives is an island nation whose territory comprises more water than land. With an Exclusive Economic Zone (EEZ) of > 900 000 km2, a population of over 380 000 scattered over 200 odd small coralline islands, a fishing fleet and industry that is ever growing (just over 1 200) and with marine fisheries as the second largest economic activity in the Island, the Maldives faces immense constraints in establishing an effective system of monitoring, control and surveillance (MCS) in its marine fisheries.

More than 20 percent of the Maldivian active labour force is engaged in marine fisheries - a majority in small-scale and industrial fish processing and production. Pole and line tuna fishing for skipjack tuna forms the major fisheries followed by hand lining and long lining for yellowfin and bigeye tuna. Reef fisheries targeting different species takes place at an artisanal and semi-commercial level. A small yet profitable aquarium fishery exists, primarily targeting the export markets. Mariculture is new, with a couple of semi-commercial projects. Small-scale mariculture is yet to start.

This paper reviews the existing institutional arrangements in the Maldives for MCS in its marine fisheries and assesses the strengths and weaknesses of these arrangements. It reviews existing marine fisheries management programmes, the regulatory framework and implementation arrangements, while assessing requirements for institutional strengthening and capacity building. The Maldivian experience in the use of Vessel Monitoring system (VMS) to support MCS in the outer EEZ is highlighted.

2.0 Regulatory framework, legislation, regulations, procedures and practices

The legal framework for the present fisheries management system is constituted by:

- The Constitution of the Republic of Maldives;
- Official mandates of relevant government agencies, and
- Relevant laws, regulations, decrees and guidelines.

The major governing regulation is the Fisheries Act (Act no: 5/87), which empowers the Ministry of Fisheries and Agriculture (MoFA) to establish and administer regulations for sustainable utilization and conservation of fish stocks and living marine resources, including protecting threatened species and establishing conservation areas.

The Fisheries Act (5/87) is primarily an enabling act that unequivocally provides that the MoFA shall oversee all fisheries activities in the country. It gives MoFA and Government

[1] *Senior Research Officer, Ministry of Fisheries and Agriculture, Government of Maldives*

certain rights in relation to management of fisheries. In addition, it describes the conditions for licensing of foreign vessels or joint ventures in the EEZ, provides for apprehension of vessels, arrest and penalties, and describes the Coastal Fishery Zone (CFZ).

The Fisheries Act is supplemented by regulations, rules, and presidential decrees. Various MoFA regulations include regulations on: fishing in lagoons; prohibitions in fishing; banned fishing gear and methods; protected marine life; protection of certain species from harvest, prior permission required for non-traditional gear; reporting violations of Fisheries Act and regulations; reporting of all fish catch and effort; issuing of licenses to fish in the Maldivian EEZ; describes license issuance by Ministry of Trade and Industry (MTI) and requirements for vessels licensed to fish in the EEZ; marine scientific research in Maldivian waters; sets out requirements for vessel-based research operations and a required application form; catch and export of yellowfin/bigeye tuna; installation of fish cages and culture in fishing lagoons; and installation of FADs on fishing grounds. Other important regulations and guidelines by MoFA include yellowfin tuna fishery and export regulations, guidelines for the preparation of fisheries project proposals and guidelines for registration of grouper fish cages.

There are also other applicable laws including the Ocean Territories Act (Act No. 6/96), Environment Protection and Preservation Act (Act No. 4/93), and other laws, decrees, and regulations relating to the use of the EEZ, fisheries, environment, business, foreign investment, and so on.

Besides the above, the other relevant regulations under other laws and decrees include: protection of species by banning export; declaration of marine protected areas and export quotas of selected species. The Environment Protection and Preservation Act of the Maldives (Act No. 4/93) and its supporting regulations provide a second tier in marine resources management. The Act recognizes that protection and preservation of land and water resources, flora and fauna, and all natural habitats are important for the country's sustainable development.

3.0 International conventions and obligations

The Maldives is party to the UN Convention on the Law of the Sea (UNCLOS, 1982) and the UN Agreement relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1993). National obligations under the UNCLOS are reflected in the Fisheries Law and its subsidiary regulations. It is also party to the UN Framework Convention on Climate Change (UNFCCC, 1992) and the Convention on Biological Diversity (CBD). Maldives was the first country to sign the Kyoto Protocol to the UNFCCC (1997). National obligations under the CBD are reflected in National Environmental Action Plan (NEAP) and other national plans and strategies.

Other fisheries and environmental related conventions signed and ratified by the Maldives include: Vienna Convention for the Protection of the Ozone Layer (1985); Montreal Protocol on Substances that Deplete the Ozone Layer (1987) and amendments to it; Basel Convention on the Transboundary Movement of Hazardous Waste and their Disposal (1989); International Convention for the Prevention of Pollution of the Sea by Oil (1954). The Maldives is party to the South Asian Regional Seas Programme and resolutions on its implementation (1994) and the Washington Declaration on Protection of the Marine Environment from Land-Based Activities (1995). It should be noted in this context that the Government is also committed to implement the Code of Conduct for Responsible Fisheries and other soft laws relevant to fisheries management.

4.0 Administrative arrangements

The Ministry of Fisheries and Agriculture is the lead agency tasked with fisheries management and development and its mandates includes:

- *Formulate and enforce laws, regulations and policies required for sustainable development of fisheries and marine resources, including those relating to Maldivian faros, reefs and lagoons;*
- *Formulate and implement policies and strategies required for sustainable development of fisheries, agriculture and marine resources of the nation;*
- *Protect and conserve the marine and terrestrial biodiversity of the nation;*
- *Collection, processing and publication of fisheries and marine resources data and statistics;*
- *Protection of endangered species;*
- *Development and installation of fish aggregating devices (FADs);*
- *Formulation and implementation of development projects which enhance the socio-economic standard of the people;*
- *Resources monitoring and conduct of multi-disciplinary research;*
- *Collect, catalogue and maintain samples of the marine and terrestrial biodiversity of the nation; and*
- *Formulate and implement regulations on scientific exploration and research into Maldivian waters, seas, seabed, subsoil and soil.*

With regard to high level policy advice and coordination with other ministries, MoFA is supported in the execution of its mandate by the Fisheries Advisory Board (FAB). The FAB is chaired by the Minister of Fisheries and Agriculture and reports to the President. The other members of the FAB are:

- ***Ministry of Economic Development and Trade*** - responsible for licensing of all commercial fishing vessels including foreign fishing vessels, including the determination of number of licenses to be issued and the negotiations and other dealings with licensees. The Ministry also issues export permits for the local tuna and reef fish trade.
- ***Ministry of Housing, Transport and Environment*** - for registration of fishing vessels and for regulatory safety checks and training of officers and crew.
- ***Maldives National Defense Force (Coast Guard)*** - for monitoring of vessel positions and enforcement of EEZ laws and regulations.
- ***Maldives Customs Service*** – for monitoring of the export fish trade and quality as well as transshipments by foreign fishing vessels.
- ***Maldives Food and Drug Authority*** – for inspection for food safety and meeting export quality standards and issues health certificates for yellowfin processors.
- ***Ministry of Tourism*** – for ensuring that the marine-related interests of the tourist industry are addressed.

5.0 Overview of existing marine fisheries management programmes

The key aspects of the current fisheries management regime are:

- Common property resource regime;
- Management, exclusion and alienation rights vested in government;
- Access, withdrawal and other use rights held by citizens;
- Boundary rules by government define restricted areas, species, gear and methods;
- Monitoring, control and surveillance by government.

Fisheries management goals are:

- Maximize benefits to Maldivians from sustainable use of marine resources;
- Assist fishing communities in rational and sustainable use of fisheries resources;
- Strengthen resource management through participatory governance;
- Promote voluntary compliance based system.

Key management issues that need to be addressed include:

- Lack of a licensing regime in the coastal fisheries zone to complement the fishing vessel registration system;
- Use of destructive fishing gear and methods;
- Misreporting of catch data;
- Harvesting of banned species and use of illegal fishing gear;
- Illegal fishing in prohibited areas;
- Poaching in the outer EEZ by foreign vessels;

- IUU fishing;
- Concern about potential over exploitation of some reef fish stocks;
- Monitoring, control and surveillance of coastal fisheries; and
- Inadequate human resources and assets for MCS.

The reef fishery resources that have been either depleted, heavily or fully exploited or are under threat of becoming so include sea cucumber, grouper, lobster, reef sharks, turtles, giant clams, various bait fish resources and other types of fin fish reef species. The immediate consequence of over harvesting is a loss in future income and food availability. A long-term consequence of a severe depletion or collapse of critical species (*e.g.* reef shark) could be the degradation of the entire reef ecosystem. The principal reef resources management issues can be classified into three categories: (1) over harvesting of stocks, (2) interactions and use conflicts and (3) physical removal, alteration and damage to the coral reef ecosystem.

In addition to the above management issues, there are cross-cutting issues of inadequate compliance by the users of marine and reef resources within the framework of existing laws and regulations. The reasons for non-compliance are manifold and cannot be exclusively attributed to weaknesses in the current MCS procedures.

Reasons for low levels of compliance could be attributed to the lack of awareness on existing rules and regulations and the inconsistencies in regulations issued by different ministries. There is also lack of reporting on rule offenders and the meting out of punishments. Reasons for this include inadequate enforcement capacities as well as the socio-cultural environment of small island communities that rely firmly on community cohesion and solidarity.

While the apprehension and punishment of law-breakers are indispensable enforcement measures, voluntarily compliance to such rules and regulations is more often seen when the community is/ has been directly and actively involved in the formulation of the regulations. Such involvement enables better understanding of the objectives as well as the benefits that accrue to all users of the natural resources in the long run by complying with the rules and regulations. Active and wide-ranging participation in rule-making is also a means of awareness creation about management issues and helps in the formation of peer pressure among users.

The ongoing activities to strengthen fisheries management in Maldives include:

- Pilot initiatives to develop participatory management arrangements for reef resources;
- Pilot initiatives to develop a Vessel Monitoring System (VMS) for the local fishing fleet;
- Formulate management plans for reef fish and sharks to ensure that resource harvesting is conducted sustainably and in the right way;
- Strengthening institutional arrangements and building human resource capacity;
- Programme to promote fishers' awareness, capacity and support for sustainable management;

- Strengthening of reporting, monitoring and surveillance arrangements for enforcement.

6.0 Current MCS capacity and institutional strengthening requirements

In October 2000, as part of the FAO FishCode Programme, a mission by a fisheries expert to the Maldives was carried out to review all aspects of MCS. The MCS review evidenced the need to update the current Fisheries Act of 1987 to address, *inter alia*:

(i) protection of the interests of fishers *vis-à-vis* competing interests in the reef/coastal waters;

(ii) aquarium fisheries;

(iii) institutional mandates;

(iv) foreign fishing;

(v) Vessel Monitoring System (VMS);

(vi) improvement in the enforcement framework, *e.g.* measures with respect to registration and marking of vessels, and

(vii) legal framework for the control of aquaculture.

As outlined earlier, MCS in the Maldives is carried out by many institutions. The MoFA has the overall mandate to manage marine resources, while Coast Guard of Maldives National Defense Force carries out the monitoring of EEZ vessels and the surveillance of the EEZ. MoFA monitors and control the fishing fleet in close collaboration with Province offices that facilitate all the reporting (fish catch, fishing activities, fishing vessel registration, infringements, etc). Given the wide spread geographical nature of the Islands, central monitoring, control and surveillance is a hurdle to fisheries management. Careful devolution of authority and responsibility for MCS is one of the options where Maldives is currently working on.

The scope of authority in the maritime sector with respect to the enhanced authority of the Atoll Administrations has not yet been resolved. However, there are differing views as to whether such a scheme of providing a specific zone for Atoll management should be considered with Tourism, Economic Development and Trade believing such a scheme would run counter

to the culture of the Maldives for sharing. The devolution of local governance will undoubtedly have considerable impact on the design and development of the MCS scheme to ensure that it is cost effective, participatory and results in local, joint resource management responsibility at the local level between stakeholders and government.

To foster greater operational coordination, it is required to establish a MCS Operational Coordinating Committee of all relevant ministries to provide a mechanism for operational planning, prioritization and possible joint patrolling for enhanced cost-effectiveness. Linked with this, there is also a need to promote private sector participation. Furthermore, international and regional cooperation opportunities need to be integrated to reduce MCS costs and to promote collective pressure to combat IUU fishing.

7.0 Recommendations for institutional strengthening

The regulatory framework for fisheries management can be strengthened and made more effective by:

- Improved coverage of fisheries management issues;
- Deterrence through increased severity of sanctions;
- Strengthening surveillance and enforcement;
- Enforcing compulsory reporting to MoFA; and
- Clearer definition of management and regulatory objectives and principles.

The monitoring system can be strengthened through:

- Timeliness, information required, coordination and personnel; and
- Monitoring of resource use change and intensity.

Options for strengthening surveillance and enforcement could include:

- Fisheries-dedicated patrol system;
- Fisher network;
- Improved fishing community reporting system;
- Observer program; and
- Capacity building and institutional strengthening.

8.0 Use of VMS in Maldives

The Maldives uses a Vessel Tracking System (VTS) for all vessels licensed to operate in the outer EEZ (the zone between 75 and 200 nm). The VTS, established in 1995, is monitored by the Maldivian Coast Guard on a regular basis. The Coast Guard monitors the movement of licensed fishing vessels in the EEZ of Maldives. This is done by installing necessary vessel tracking transponder equipment on board the vessel, which is mandatory under the Fishing License Agreement between the Licensee and the Ministry of Economic Development and Trade. Clause 6 of the Agreement states that the Licensee's fishing vessel shall install the necessary transceiver equipment approved by the government for communication links with the VTS in Malé, before embarking on any fishing operation in the Licensed Fishing Zone of the Republic of Maldives. This rule applies to all licensed fishing vessels with the permitted fishing methods (pole and line fishing, long line fishing or trolling) in the Maldives. The same is applied to all licensed fishing vessels where both types of royalties (yearly/per catch) are imposed.

8.1 Application procedure

After issuing license for fishing in the EEZ, the Coast Guard gives each licensed party the necessary information regarding the required transponder unit which in this case is Inmarsat - C terminals. The most common VTS compatible ones are Galaxy Trimble, Thrane and Thrane, Sailor, etc. Following the registration of these terminals from Dhiraagu and Telecommunication Authority of Maldives (TAM), TAM issues an Inmarsat Terminal Operating License (ITOL) to the vessel. This license contains the Inmarsat Mobile Number (IMN) which later is used in adding the transponder to the VTS.

8.2 How the system works

The VTS works with Xantic[2] Company of Australia and the Land Earth Station (LES) is in Perth, Australia. Upon obtaining the ITOL from TAM, the local agents bring the C – terminals to Coast Guard for programming and adding it to the VTS. The Coast Guard then sends the terminal information via fax/e-mail to Xantic, Australia, where they have a special DNID for the Ministry of Defense of the Maldives. After adding it to the DNID, the terminal which is powered on starts sending data to the LES in Australia. The data include the present position-Latitude/Longitude, time, speed, bearing, etc. This data is stored in a mail box for the specified DNID. After every one hour, the VTS of Coast Guard receives the aforementioned data through internet. The VTS automatically updates every one hour, provided that there is internet connection.

8.3 The Vessel Tracking System Software

The terravision software used in VTS is designed in Oracle. It contains five modules, namely the server module, event manager, Inmarsat module, the display module and the setup module.

8.4 Limitations

The current VTS has some limitations which pose problems to the Coast Guard in its MCS activities. These limitations include:

- This system can only identify vessels with the programmed transponder; vessels without the programmed transponder cannot be identified from this VTS.
- Power failure is frequently reported. Most of the vessels do not have a separate power supply for the transponder unit.
- The main disadvantage is seen as there is no written rule and regulation in operating the vessel transponder.

9.0 Ongoing pilot MCS programme

A full-fledged MCS programme for a country with some 200 islands spread over 800 km will be very expensive. Keeping in view this situation, implementing a cost-effective VMS to effectively combat IUU fishing remains a hurdle for countries like Maldives. Therefore, the MoFA in conjunction with Marine Research Section is currently piloting a World Bank funded project to establish if GSM/GPRS based VTS is a suitable option for the Maldives. Twenty (20) GSM-based vessel tracking devices are to be installed and tested on different types of

[2] *Stratos and Xantic are now one company after Stratos' acquisition of Xantic on 14th February 2006. As part of this integration, the Land Earth Station (LES) code has been rationalized. The previous LES code now has been changed from Perth LES x22 to Burun LES x12. This transfer was completed in October 2006.*

fishing vessels for their effectiveness and usefulness to combat IUU fishing and to comply with the European Union's new standards that will come into effect by January 2010.

10.0 Assessment of needs and requirements for regional cooperation in MCS

Invariably, without regional cooperation, IUU fishing cannot be dealt with. Even if one country in the region has a good MCS programme with VMS installed in its entire fleet, if neighboring country does not have such a system, poaching cannot be stopped. This is especially true for a country like the Maldives, where both human and financial resources are scarce and the area to patrol is enormous. Therefore, a regional initiative for MCS is paramount. Regional black lists, white lists and information sharing amongst the regional fishing authorities will enable the port states to successfully implement port state measures. As such, Maldives is trying to join regional forums to combat IUU fishing. Maldives is already a member of BOBP-IGO and have been actively participating in SWIOFC activities. While fully supporting BOBP's work in combating IUU fishing, in the last SWIOFC session held in Seychelles, Maldives has given its support to SWIOFC in formulating a network of heads of MCS operations and also supported the idea of creating a black and a white list of fishing vessels.

* * *

GoM/BOBP-IGO National Workshop on Monitoring, Control and Surveillance in Marine Fisheries – Maldives
Malé, Maldives, 22-23 March 2009

The Status of Marine Fisheries in Maldives and its Preparedness for a Monitoring, Control and Surveillance Regime

***Shahaama A Sattar*[1], *Shiham Adam*[2] *and Mariyam Saleem*[3]**

1.0 Introduction

The Maldives is an island nation whose territory comprises more water than land. It is made up of approximately 1 200 coral islands and covers about 90 000 km^2 in the Indian Ocean. The total reef surface area of the Maldives covers an area of 21 372.72 km^2. Being completely surrounded by the sea, Maldives is highly dependent on marine resources, both as a source of food and income, whether it is in terms of tourism or fisheries. Pole and line tuna fishing had been Maldives' main source of income for over hundreds of years, till the introduction of tourism, which now contributes more to the GDP.

Fisheries in the Maldives are governed by the Fisheries Law of the Maldives (Law No. 5/87), which defines the Exclusive Economic Zone (EEZ) as the area bounded by the 75 – 200 nautical miles. The EEZ of the country covers approximately 1.0 million km^2.

Fishing vessels flagged in the Maldives operate only within the EEZ of the country and do not operate in any of the adjacent high seas areas. The Maldivian fishermen operate within close range (<50 miles) of the atolls. Thus relatively a large area of the Maldivian EEZ remains under exploited, although there have been complaints by local fishermen regarding illegal fishing carried out by foreign vessels.

2.0 Status of the Maldivian fishery resources

The tuna fishery is the main fishery of the Maldives and has been carried out since the time of our ancestors. The traditional tuna fishery targets the skipjack tuna, *Katsuwonus pelamis* and is carried out using pole and line. More recently, the reef fishery and the grouper fishery started playing a bigger role in the fisheries industry. The grouper fishery is export-market driven, while the reef fishery caters to the expanding tourism industry of the Maldives. Sharks have also been targeted since the early days, although since 01 March 2009 there has been a ban on the reef shark fishery, with this ban possibly extending to all oceanic shark fishing activities after one year. The following section looks at the individual fisheries and trends in their abundance, catch composition and exploitation.

2.1 Tuna fishery in Maldives

The Maldivian pole and line tuna fishery has been in existence for hundreds of years. The sailing fleet underwent mechanization in the 1970s. By mid 1980s the second generation vessels that replaced the converted sailing vessels increased the catch by threefold. However, further rapid increase in catch was slow until late 1990s with third generation fiberglass (FRP) vessels joining the fleet. Catches then doubled from 1996 to 2006. Private sector investments in post-harvest sector are driving the most recent phase of fishery expansion.

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These include the additional collection and cold storage facilities, canneries and the rapidly growing fresh tuna export business.

Total reported tuna catches at present are 1 70 000 mt of which 80 percent is skipjack tuna (*Katsuwonus pelamis*) followed by yellowfin tuna (*Thunnus albacares*). Other coastal varieties, frigate tuna (*Auxis thazard*) and kawakawa (*Euthynnus affinis*) are caught in small quantities, < 5 percent at present **(*Figure 1*)**. Roughly a third of this catch is consumed locally and the rest is exported in canned, fresh/chilled, frozen, dried and other forms. The total export earnings in recent years were in excess of US$ 100 million.

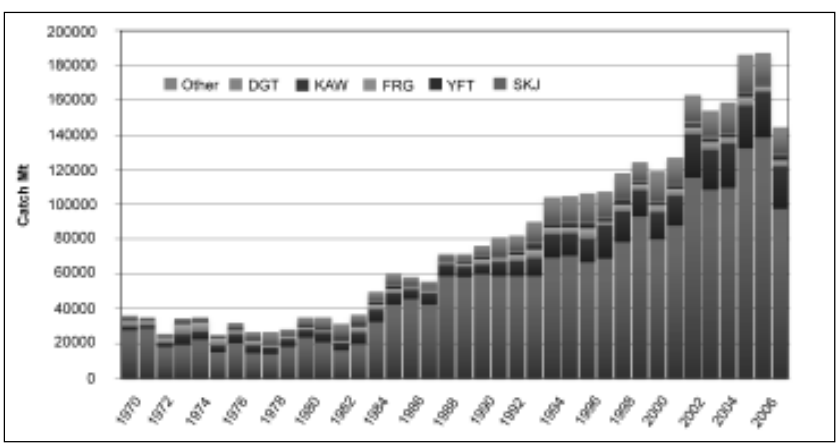
The increasing fishing power and efficiency of fishing vessels have resulted increases in catch per fishing day (catch per unit effort, CPUE) for both skipjack and yellowfin. Skipjack CPUE increased almost consistently in recent years; from about 270 kg day in 1997 to over 600 kg /day during 2006. Yellowfin CPUE has been also being increasing from 50 kg /day in 2000 to over 100 kg/day in 2006.

The export business of fresh large yellowfin tuna is growing with increasing investments and availability of ice in the outer atolls. Catches are made exclusively from handline method and target dolphin-associated schools. During 2006 the total volume exported was over 8 000 mt fetching an export value of over US$ 29 million which is nearly 30 percent of the total marine export revenue.

A foreign licensed longline fleet operates in the EEZ of the Maldives (75 miles and beyond). About 40 vessels are licensed to operate in the EEZ although the numbers that actually operated in the recent years may be lower. Roughly 3 500 tonne are reported, mainly bigeye and yellowfin tuna. A substantial amount of this catch is landed in Malé and exported fresh.

Declines in tuna catches in 2007 and 2008 have raised concerns about the status of the stock. Stock assessments undertaken by the Indian Ocean Tuna Commission (IOTC) have shown that current Indian Ocean catches are more than replacement yield of the stock. For skipjack no assessment has been done. Sound implementation of Monitoring, Control and Surveillance (MCS) in Maldives will necessitate undertaking fishing capacity assessment of the Maldivian fishing fleet, which will also be an important input to the stock assessment work.

Figure 1: Pole and line yellowfin and skipjack tuna catch from 1970-2007.
SKJ- Skipjack, YFT- yellowfin tuna, KAW- Kawakawa, FRG- frigate tuna, DGT- dogtooth tuna, Other- reef fish



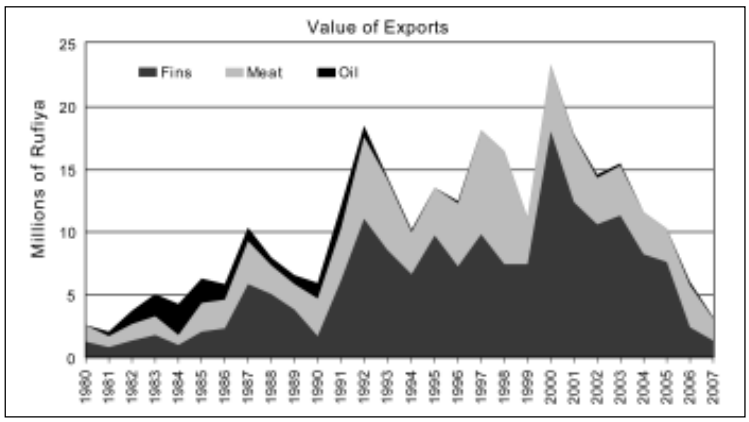
2.2 Shark fishery

Shark fishery in the Maldives originated due to the introduction of export industry in the late 1970s. The fishery soon expanded as a result of the demand from the export market for high valued shark fins, salted shark meat and shark liver oil from gulper sharks. Three types of shark fishery have been carried out in the Maldives; the reef shark fishery, oceanic shark fishery and the deep water gulper shark fishery. Due to their slow growth, late maturity and low fecundity, shark stocks quickly diminished under intense exploitation. Several conflicts have arisen due to the close links between the shark fishery and the tourism sector as well as the tuna fishing industry. A 10 year moratorium was imposed on shark fishing inside and within 12 miles from the atoll rim of 7 atolls in the Maldives in September 1998. While the moratorium was not renewed at the end of the period, it has been declared that the ban will be extended to include all atolls and will be effective from 01 March 2009. While the initial moratorium was limited to 7 atolls where tourism was established, the recent legislation includes the entire Maldives given the recent expansion of the sector. In addition, the Fisheries Advisory Board has resolved to phase out shark fishing and to ban all export of shark products from the country over the next year.

Status of the fishery: The three types of shark fishery that exist in Maldives today are largely driven by the export demand with domestic consumption of shark products being very limited. Exported products include shark fins, shark liver oil, frozen or chilled shark and fins and salted dried meat. In addition, the jaws of large sharks are sold at the souvenir shops for the tourists.

The data on export revenues are in the form of declared FOB (free on board) values. Annual revenue from the shark fishery has fluctuated between 1980 and 2007 with a peak of over Rf 23 million in 2000 (***Figure 2***), which can be attributed to the high prices fetched per kilo of dried shark fins that year. However, export of shark products contributed only 0.24 percent to the total marine exports of Maldives in 2007 (***Figure 3***). Export prices for shark fins have been consistent with international market prices and the drastic decline in unit prices in 1990 was caused by a drop in Chinese demand combined with some price manipulation by major international traders (Cook, 1990). At present, the price per kilogram of fins appears to be declining and this is possibly due to under reporting at the Maldives Customs.

Figure 2: Value of exports of shark products 1980 - 2007

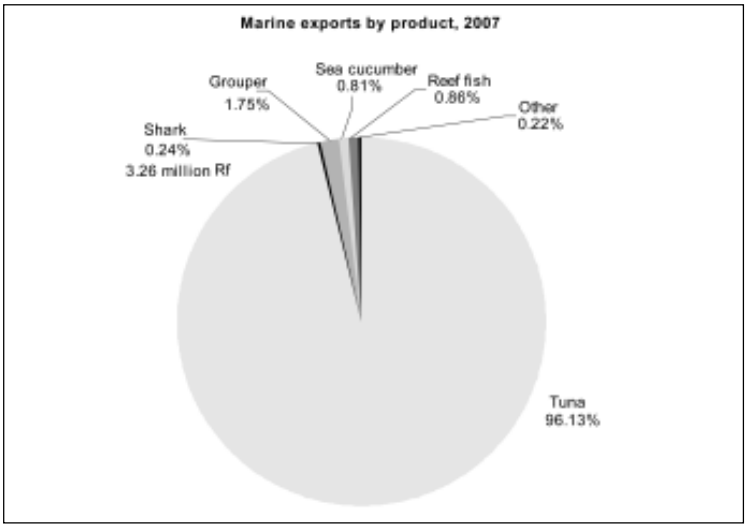


Source: Customs data compiled by Statistic Section of MoFA

On an average 15 - 25 metric tonnes of shark fins were exported each year between 1980 and 2007 with the quantity exported declining below this average in the latter years (***Figure 4***). This decline is due to low levels of catch in these years in conjunction with the low prices paid per kilo of shark fins.

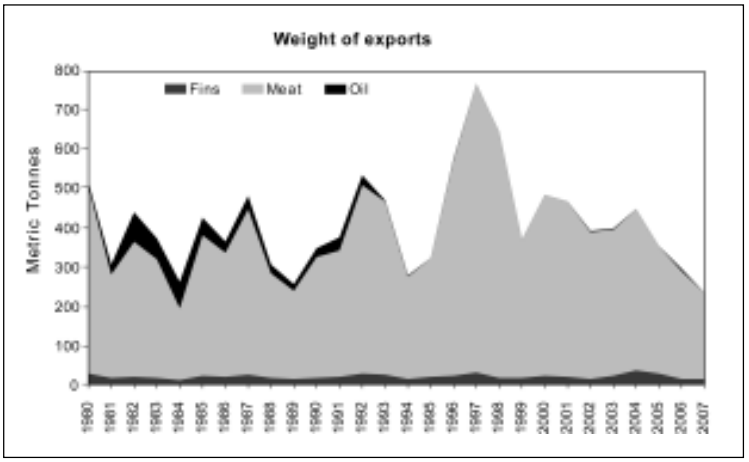
The quantities of squalene-rich shark liver oil exported were highest in the early '80s (***Figure 4***). Export revenue from this product increased from zero in 1979 to a peak of Rf 2.4 million in 1984. The quantity exported and the value derived has dramatically declined since 1992, with almost nil exports in the past 15 years. This decline can be attributed to decreasing catch rates together with relatively low prices paid to the fishermen, therefore reducing the income generated by the fishery. However, in the past two years, there was an effort to renew exports, although the quantity exported was lower in 2008 compared to 2007.

Figure 3: Marine exports by product in 2007



Source: Customs data compiled by Statistic Section of MoFA

Figure 4: Weight of exports of shark products 1980 - 2007



Source: Customs data compiled by Statistic Section of MoFA

2.3 Reef fishery

A small-scale reef fishery was carried out in the Maldives prior to tourism mainly for local consumption. With the introduction of the tourism industry, this fishery which was previously on a small-scale expanded to provide for the tourism industry as well as the export industry, which had by then established. The export-oriented fishery was catering to the South-East Asian markets in the form of both fresh/chilled and live exports.

Exploitation of reef fish was carried out in a similar manner to that of tuna, with little regard to its consequences to the reef resources. In comparison to tuna fishing where fishermen have to travel long distances and spend long hours and sometimes days away from their home and families, reef fishing could be carried out close to the islands and on daily trips. This reduced effort and high abundance of reef resources at the beginning of the export- oriented fishery was another reason for many fishermen switching from tuna to reef fish. Although fishing was carried out on a small-scale in the islands, it still played an important role in the livelihoods of the island community; many going for reef fishing on an opportunistic basis while others carrying out reef fishing as a part-time employment. However, there were and still are a few island communities, which carry out reef fishing as their primary income earning activity. There are also a few communities which target a specific reef resource (***e.g.*** groupers) and carry that out as their main income-earning activity.

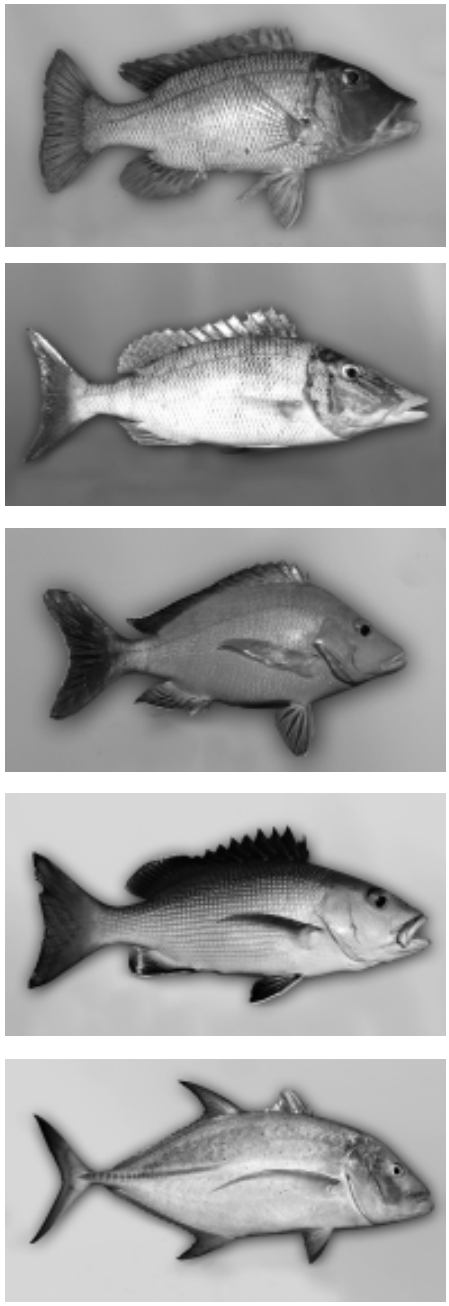
3.0 Fishery status

3.1 Catch abundance and composition

Following exploratory surveys in 1988/1989 and 1990/1991, a MSY of 30 000 + 13 000 tonnes/year was estimated (Source: Anderson *et al., 1992)*. However, it is believed that reef fish is being exploited at levels below this MSY. To verify this assumption, an attempt has been made to calculate or estimate the total catch of reef fish from the whole of Maldives on an annual basis.

Using the equation for the linear regression and the total surface area of Maldives *i.e.* 21 372.72 km2 (Source: Naseer and Hatcher, 2004) we can estimate the total catch from the whole of Maldives to be approximately 16 000 metric tonnes per year (*i.e.* slightly more than 50% of the estimated 30 000 tonnes MSY) (Refer to Sattar, 2008 for details on calculation). Majority of this catch is sold to resorts at an average price of 10Rf/kg. However, this would be an underestimate of the total as it does not account for the catch made by fishermen who fish on an opportunistic basis and sell their catch in the islands itself. It also does not account for the grouper fishermen from Baa atoll who do not get their catch solely from within the atolls, but make fishing trips throughout the Maldives, which could last at least for a month.

Classification of the catch into the various families shows the following total composition (data from over 2 year survey period): *Carangids (41.63%), Lutjanids (21.56%), Scombrids*



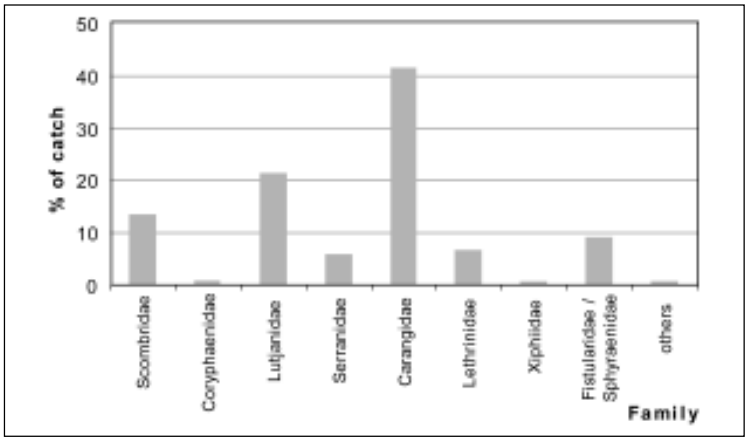
Some reef fishes of Maldives.

(13.66%), Fistularids and Sphyraenids (9.11%), Lethrinids (6.79%), Serranids (5.85%), Coryphaenids (0.25%) and Xiphiids (0.22%) (***Figure 5***).

A look at the catch composition on a species and genus level shows that Rainbow runner (*Elagatis bipinnulata)* dominates the catch. The high contribution by *E. bipinnulata* and different species belonging to jacks explains the high percentage contributed by carangids (86%) towards the total.

A change in catch composition is difficult to show over the years as data collection for the reef fishery has been very vague. Data collected is based on three size groups and it is unclear as to which species are included in these groups. One very important step which needs to be immediately carried out is the strengthening of the data collection system for the reef fishery, so that reports of catch can be obtained on species-wise basis.

Figure 5: Family-wise catch composition from reef resources

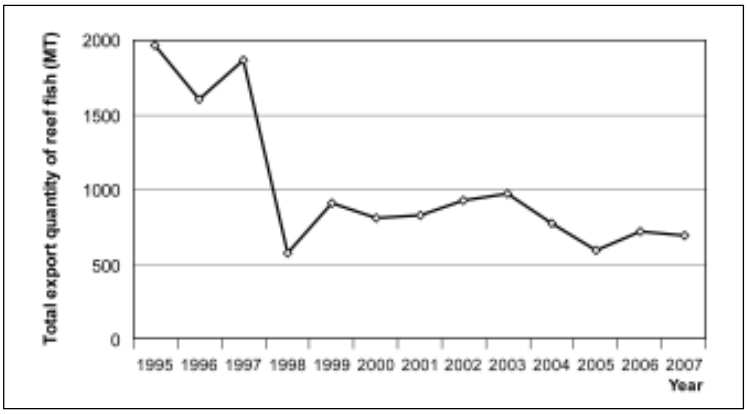


4.0 Export status

Exports are mainly in live, fresh/chilled, dried or salt-dried forms. Maldives Customs Services collect reef fish export data as mentioned earlier and this data is annually published in the Basic Fisheries Statistics booklet by the Ministry of Fisheries and Agriculture (MoFA). It should be noted here that since reef fishery in the Maldives is mainly targeted towards the tourism industry, export figures would only show a fraction of the catch that is actually caught. Overall, as seen in ***Figure 3***, reef fish exports (inclusive of grouper exports) constituted only 2.61 percent of the total marine exports for the year 2007. If we calculate the reef fish exports (excluding the groupers), it comes to an insignificant of 0.86 percent of the total marine exports.

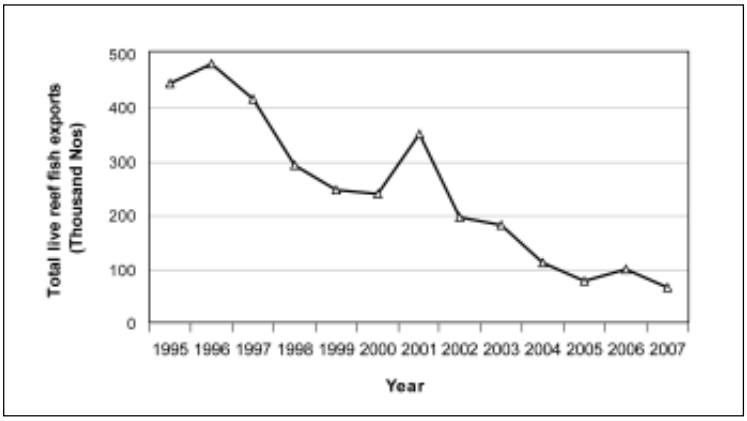
Trends in the export quantities and prices are shown in figures below. ***Figure 6*** shows the trend in total export of reef fish (except live exports) for the last 12 years. It is seen that there was a sudden drop in exports in 1998, but has remained stable since then. It is also seen that exports are 50 percent lower in terms of quantity, than they were prior to 1998. In 2007, approximately 700 metric tonnes of reef fish were exported, which is about 4.375 percent of the estimated catch of 16 000 tonnes/ year.

Figure 6: Total export quantity (MT) of reef fish (bar live exports)



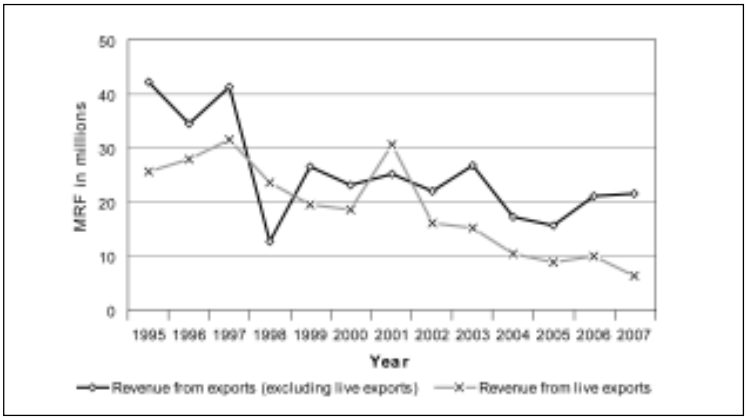
Source: MoFA Basic Fisheries Statistics (1995-2007)

Figure 7: Total export quantities of live reef fish



Source: MoFA Basic Fisheries Statistics (1995-2007)

Figure 8: Revenue from the export of reef fish



Source: MoFA Basic Fisheries Statistics (1995-2007)

Figure 7 shows the trend in total export quantities of live reef fish (groupers inclusive), which is seen to be decreasing. This is similar to what was previously reported for the live grouper exports. As the live reef fish exports are dominated by grouper exports with a contribution between 91 – 100 percent in all years, the above trend is hardly surprising.

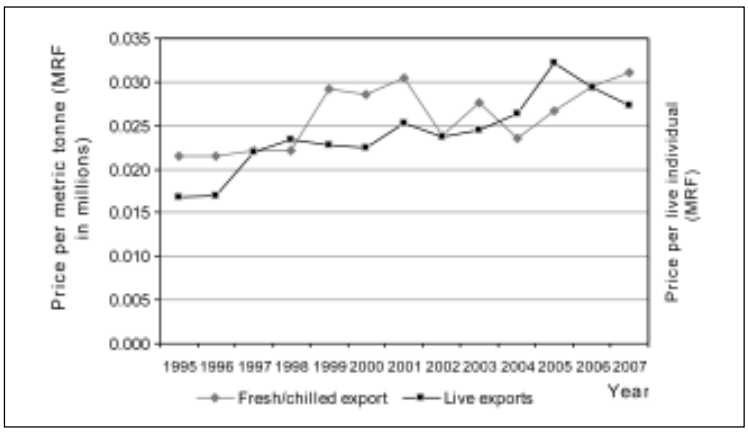
Figure 8 shows the total income earned by export of all forms of reef fish. The total income earned by live reef fish exports closely follows the trend for the export quantities of live reef fish. In general, since 1997 the income earned due to live exports shows a decreasing trend to date, although from 2000 to 2001 the earnings increased substantially.

Figure 9 shows the price paid per metric tonne and price per individual in the live reef fish export trade. Price paid per metric tonne represents for all forms of export bar live exports (*i.e.* fresh/chilled, salt/dried, dried and frozen forms) by both government and private sector. Price paid per metric tonne is seen to fluctuate from the year 1998 onwards. However, since 2004, this is seen to be on the increasing trend. On the other hand price per individual for live exports show an increasing trend from the beginning till 2005, when it started showing a decreasing trend to date. Hence between 1995 and 2005, although export quantities of live reef fish were on a decreasing trend (***Figure 6***) the buyers were paying higher prices to obtain the fishes. This in itself was an incentive for exporters and fishermen to stay in the business in times of declining fisheries. Since 2005, however the decline in value per unit grouper (live) indicates that prices had either fallen in the outside market, or that the size of individual caught had decreased (live groupers are paid set rates per individual depending on the weight of the individual, *i.e.* the larger the individual the higher the price).

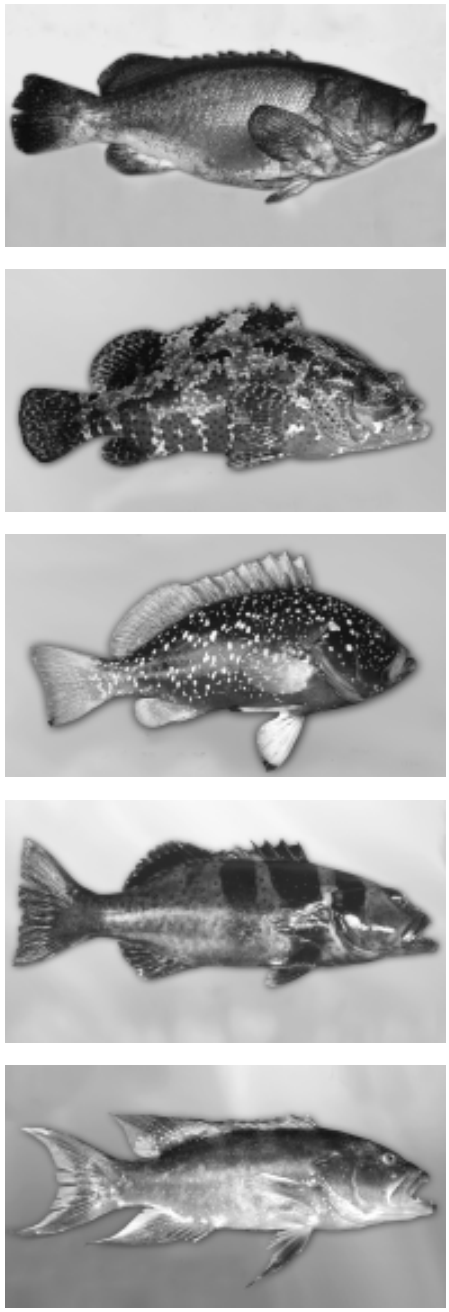
Although both live and fresh/chilled reef fish exports in general show a decreasing trend and appear to be exported in much less quantities than a decade ago, these exports are more widespread than what is actually reported.

Due to its ecological and socio-economic importance, reef fishery in the Maldives needs to be managed properly for it to remain sustainable. However, for a fishery which is being carried out on a large scale, the amount of monitoring which has been done to date and the collection of both fishery-dependent and fishery independent data has been poor.

Figure 9: Price per metric tonne for total reef fish exports and price per individual exported in the live reef fish export trade



Source: MOFA Basic Fisheries Statistics (1995-2007)



Some grouper species of Maldives.

5.0 Grouper fishery

The grouper fishery and export industry, which reached its peak in the mid 1990s, is currently on a downward trend due to declining stocks throughout the Maldives. The fishery which began in the central atolls, spread throughout the Maldives with the increasing demand for groupers by the international market. Studies in 2005 showed catches to have decreased from 100-170 per day in the 1990s to 40–50 fish per day. Mortality during cage-holding has decreased with the skills and techniques gained over time. In 1995, with the intensification of the grouper export industry, groupers contributed 10 percent towards the total value obtained from marine exports for that year. In comparison to this, in 2002 groupers contributed 4 percent towards the total income derived from marine exports.

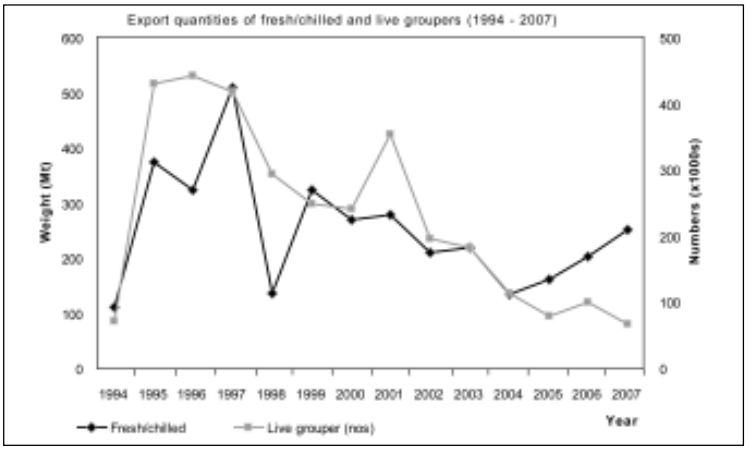
Fishermen have reported consistently lower catches and sizes. Greater effort is needed to obtain a sizeable quantity of fish. Groupers are easily over fished as there are no size-restrictions established. Large quantities of fish are caught prior to maturity, disrupting spawning and the regeneration of stocks. Grouper stocks in the Maldives are currently over exploited and are in dire need of management.

Maldives has approximately 40-45 species of groupers, which belong to 7 genera: Aethaloperca, Anyperodon, Cephalopholis, Epinephelus, Gracila, Plectropomus and Variola. Most commonly caught species of groupers are *Aethaloperca rogaa*, *Anyperodon leucogrammicus*, *Cephalopholis miniata*, *C. argus*, *Epinephelus fuscoguttatus*, *E. spilotoceps*, *E. polyphekadion*, *Plectropomus areolatus*, *P. laevis*, *P. pessuliferus* and *Variola louti*.

5.1 Fishery Status

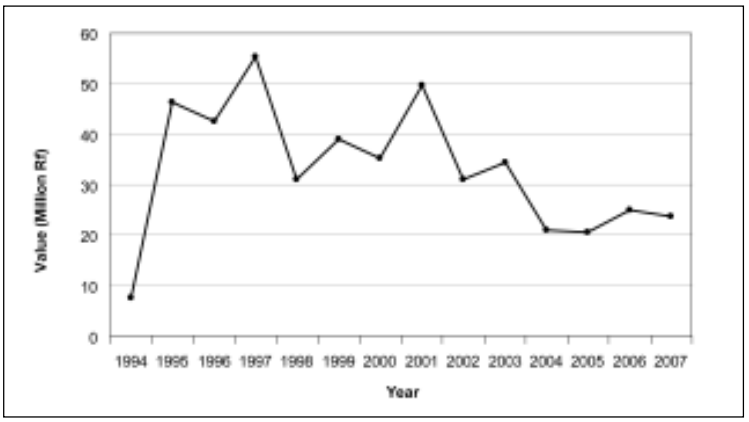
Grouper fishery has been on a decline over the past few years. Catch reports of groupers show the trend to some extent. However, since catch data has not being reported regularly by all fishermen, trends in the fishery have to be deduced from export statistics. In 2007, grouper exports contributed 1.75 percent towards all marine exports (***Figure 3***).

Figure 10: Export trends of fresh/ chilled groupers and live groupers (1994 to 2007)



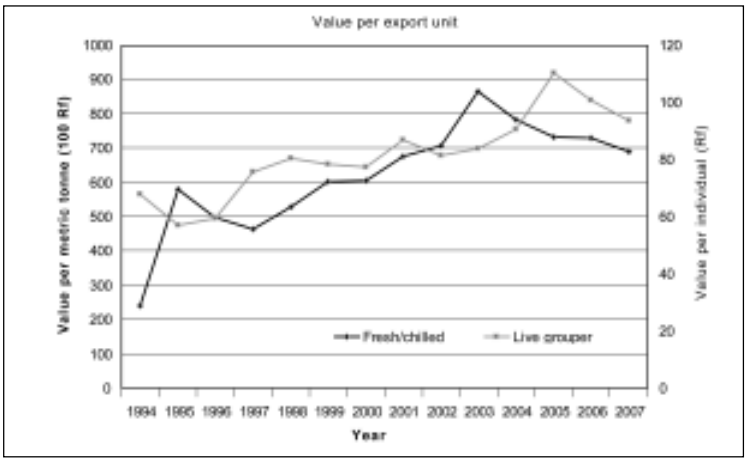
Source: MOFA Basic Fisheries Statistics (1995-2007)

Figure 11: Total value obtained from all grouper exports (1994-2007)



Source: MOFA Basic Fisheries Statistics (1995-2007)

Figure 12: Value per export unit for groupers (1994 to 2007)



Source: MOFA Basic Fisheries Statistics (1995-2007)

As seen in ***Figure 10***, grouper exports for fresh/ chilled and live exports have decreased from mid-1990 when the fishery was at its peak. Fresh/ chilled exports, although on an increasing trend over the past 4 years, have decreased by half from what it was in the mid 1990s. Similarly, live exports have also been on a decreasing trend since late 1990s (with an exception in 2001). What is important to note is that although fresh/ chilled grouper exports show an increase, these are the low-value species or the secondary species. The most valuable species such as *E. fuscoguttatus*, *P. laevis*, *P. areolatus* and *P. pessuliferus* are exported live and such a large decrease in the export quantities indicate that these species have either been fully or over-exploited.

Figure 11 (facing page) shows the total income from grouper exports between the years 1994 to 2007. As can be seen in comparison to ***Figure 10***, income earned closely follows the trend for live grouper exports indicating that live exports play a major role in terms of revenue earned.

The value per unit, for both live and fresh/chilled exports has been on a decrease for the past 3 years **(*Figure 12*)**. Value per individual for live exports, which brings in higher revenue has decreased by almost 18 percent value per individual in the last 3 years, while fresh/chilled exports went down in value by approximately 20 percent. Similar reasons as that for decreased value per unit export of reef fish could be used to explain this decrease.

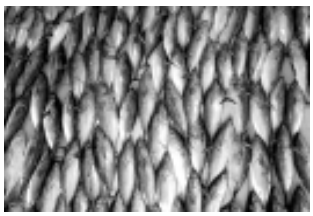
* * *

Salient Information on Fisheries in the Maldives

Population of the Maldives

Census Year	National			Fishers (12 years & over)		
	Male	Female	Total	Male	Female	Total
1985	93 482	86 606	180 088	na	na	na
1990	109 336	103 879	213 215	11 181	317	11 498
1995	124 622	120 192	244 814	na	na	na
2000	137 200	132 901	270 101	9 181	113	9 294
2006	151 459	147 509	298 968	8 233	155	8 388

na = not mentioned in the source.
Source: (1) The 25 Years of Statistics: Maldives. Ministry of Planning and National Development, Government of Maldives. May 2005.
(2) Statistical Yearbook of Maldives (various years). Ministry of Planning and National Development, Government of Maldives.



Major fish species landed in the Maldives

Year/ Species	Bigeye tuna	Dogtooth tuna	Frigate and bullet tunas	Kawakawa	Marine fishes nei	Sharks rays skates, etc. nei	Skipjack tuna	Yellowfin tuna
1981	230	446	1 014	1 474	9 940	1 500	20 061	6 251
1982	98	509	1 302	2 184	11 471	2 000	15 460	4 814
1983	165	343	2 207	2 374	9 863	1 700	19 477	7 981
1984	368	377	1 932	1 543	9 647	1 060	32 668	8 486
1985	317	178	1 621	2 353	5 941	2 078	42 453	7 135
1986	213	137	1 051	1 248	3 004	2 476	45 474	6 352
1987	318	512	1 177	1 430	1 830	2 631	42 910	7 595
1988	317	84	1 629	1 256	1 114	1 768	58 545	6 217
1989	306	107	2 145	1 321	1 724	1 309	58 146	5 777
1990	294	292	3 345	2 036	3 643	1 783	61 425	5 139
1991	484	234	2 582	1 676	7 293	1 873	58 899	7 227
1992	388	336	3 389	2 450	1 635	6 921	58 577	8 309
1993	505	627	5 455	3 569	2 242	9 168	58 741	9 603
1994	506	388	4 018	2 656	3 123	11 212	69 410	12 621
1995	473	438	3 938	2 694	3 138	11 245	70 372	12 031
1996	630	625	6 484	3 789	3 576	11 856	66 502	11 811
1997	540	489	2 489	2 089	9 333	10 643	69 015	12 489
1998	606	470	4 218	3 624	5 935	10 887	78 410	13 566
1999	1 007	426	3 401	1 692	4 012	6 883	92 888	13 261
2000	560	451	3 991	1 898	6 156	13 523	79 682	11 624
2001	923	647	3 981	2 150	5 610	11 935	88 043	13 656
2002	1 323	789	4 187	2 241	7 211	11 498	115 321	20 603
2003	1 284	746	4 357	2 406	7 686	11 522	108 329	18 825
2004	1 190	615	3 638	2 290	9 607	9 475	109 749	21 394
2005	1 047	542	5 057	2 702	22 989	896	132 061	20 512
2006	1 111	512	3 532	1 674	16 135	856	138 458	21 772
2007	932	499	3 802	2 790	17 730	782	96 860	20 661
2008	1 106	571	4 065	2 094	15 724	537	87 275	21 630

Unit: tonnes; nei = Not elsewhere included
Source: FAO Fisheries Department, Fishery Information Data and Statistics Unit.
FISHSTAT Plus: Universal software for fishery time series. Version 2.3.2000

Catch by fishing methods in the Maldives

Year	Fishing methods							
								Landing in tonnes
	Pole and Line	**Trolling**	**Long Line**	**Hand Line**	**Fixed Gillnets**	**EEZ**	**Miscellaneous**	**Total**
1985	53 649	7 262	99	229	124	na	562	61 925
1986	54 157	4 492	69	57	90	na	416	59 281
1987	52 255	4 188	44	72	37	na	396	56 992
1988	68 394	2 790	47	36	18	na	199	71 483
1989	67 998	2 575	93	45	7	na	529	71 247
1990	72 148	3 877	15	4	9	na	320	76 373
1991	75 614	4 922	4	7	29	na	138	80 713
1992	76 124	5 442	63	27	115	na	263	82 035
1993	79 957	9 574	90	7	90	na	222	89 941
1994	96 842	6 666	148	57	31	na	302	104 046
1995	97 491	6 997	77	na	1	na	na	104 566
1996	97 780	6 577	339	502	212	na	2	105 413
1997	94 591	6 295	122	64	695	5 590	0	107 358
1998	107 512	5 943	113	1 188	301	2 994	65	118 115
1999	116 421	6 353	1	304	199	811	20	124 109
2000	106 338	8 164	48	282	594	3 521	16	118 963
2001	114 799	9 221	206	368	344	2 213	33	127 184
2002	148 634	6 838	196	3 679	866	3 139	35	163 388
2003	143 327	3 839	148	3 620	1 213	3 165	104	155 415
2004	137 363	16 029	444	799	1 361	2 546	34	158 576
2005	164 822	8 114	359	7 171	2 256	3 010	247	185 980
2006	164 837	2 966	206	12 712	253	3 177	8	184 158
2007	124 010	3 387	285	12 627	232	3 048	8	143 597
2008	117 363	4 606	295	9 360	111	1 350	0	133 086

na = not mentioned in the source.
Note: Due to rounding, catch totals may not agree with that of other tables.
Source: Statistical Yearbook of Maldives (various years). Ministry of Planning and National Development, Government of Maldives.

Number of registered fishing vessels and average number of fishing vessels operated per month in the Maldives

Year	Number of registered fishing vessels	Average number of fishing vessels engaged per month						
		Mechanized Masdhoni	Mechanized Vadhu dhoni	Sailing Masdhoni	Sailing Vadhu dhoni	Rowing Boats	EEZ Vessels	Trolling Vessels
1981	7 149	970	-	1 061	-	-	-	3 364
1982	7 451	995	-	952	-	-	-	3 428
1983	7 816	1 231	-	811	-	-	-	3 448
1984	8 148	1 296	-	651	-	-	-	3 021
1985	8 401	988	-	43	-	42	-	963
1986	8 598	1 009	-	32	-	33	-	753
1987	9 105	1 044	-	21	-	28	-	655
1988	9 228	1 096	-	16	-	33	-	505
1989	9 371	1 114	-	14	-	34	-	414
1990	9 597	1 151	-	11	-	17	-	354
1991	9 824	1 252	-	6	-	25	-	352
1992	2 221	1 347	-	38	-	21	-	271
1993	2 332	1 434	-	15	-	22	-	320
1994	2 368	1 410	-	42	-	37	-	324
1995	2 464	1 406	52	8	211	8	-	na
1996	2 562	1 397	63	13	169	22	-	na
1997	2880	1 328	102	9	139	20	48	na
1998	3008	1 271	61	30	125	24	46	na
1999	2852	1 206	70	52	68	15	32	na
2000	2972	1 137	58	41	72	19	49	na
2001	3088	1 128	49	66	40	13	20	na
2002	6 982	1 102	59	90	9	16	43	na
2003	7 154	1 104	46	115	4	18	31	na
2004	4 341	1 112	8	61	25	22	36	na
2005	4 587	1 002	5	63	15	18	0	na
2006	4 886	923	3	44	11	14	24	na
2007	5 232	888	10	42	17	16	25	na
2008	4 587	867	34	40	17	7	13	na

Note: (i) For registered fishing vessels, 2002 onward there is no separate classification for fishing vessels in the source. Number of dhonis is given as a proxy. (ii) For average number of fishing vessels engaged per month, data is available for 'mechanized dhonis' and' sailing dhonis'. Disaggregated data has been given in the source from 1995.

Source: (1) The 25 Years of Statistics: Maldives. Ministry of Planning and National Development, Government of Maldives. May 2005. (2) Statistical Yearbook of Maldives (various years). Ministry of Planning and National Development, Government of Maldives.

Average number of trips made by fishing vessels in the Maldives

Year	Mechanized Masdhoni	Mechanized Vadhu dhoni	Sailing Masdhoni	Sailing Vadhu dhoni	Rowing Boats	EEZ Vessels	Trolling Vessels
1981	85	na	13	na	na	na	44
1982	95	na	11	na	na	na	39
1983	95	na	8	na	na	na	34
1984	118	na	10	na	na	na	36
1985	164	na	109	na	65	na	114
1986	160	na	105	na	55	na	105
1987	152	na	112	na	80	na	106
1988	168	na	78	na	74	na	102
1989	165	na	65	na	78	na	96
1990	168	na	68*	na	89	na	4
1991	158	na	71	na	90	na	102
1992	152	na	95	na	85	na	104
1993	155	na	70	na	77	na	108
1994	158	na	27	na	26	na	98
1995	171	130	78	114	82	na	na
1996	172	154	56	123	91	na	na
1997	179	156	64	117	84	94	na
1998	177	146	101	124	100	87	na
1999	175	147	116	118	124	45	na
2000	178	158	148	116	145	91	na
2001	183	179	144	138	210	169	na
2002	190	161	153	109	175	174	na
2003	189	174	143	128	171	206	na
2004	192	54	150	90	119	306	na
2005	190	129	127	111	169	na	na
2006	189	184	155	106	138	336	na
2007	194	101	153	111	124	288	na
2008	198	131	147	110	117	250	na

na = not mentioned in the source.

** Figure need further verification*

Note: (i) For average number of fishing trips per vessel, data is available for 'mechanized dhonis' and' sailing dhonis'. Disaggregated data has been given in the source from 1995.

Source: (1) The 25 Years of Statistics: Maldives. Ministry of Planning and National Development, Government of Maldives. May 2005.
(2) Statistical Yearbook of Maldives (various years). Ministry of Planning and National Development, Government of Maldives.

Export of fisheries products from Maldives

Year	Other fish salted or in brine		Other freshwater and saltwater fish-fresh or chilled		Other freshwater and saltwater fish frozen	
	1		2		3	
	Quantity	Value	Quantity	Value	Quantity	Value
1981	975	674	-	-	-	-
1982	897	690	-	-	-	-
1983	778	613	-	-	-	-
1984	838	671	-	-	-	-
1985	1 820	1 745	-	-	-	-
1986	1 335	989	-	-	-	-
1987	844	522	-	-	-	-
1988	428	494	-	-	-	-
1989	1 229	806	-	-	-	-
1990	2 084	1 597	-	-	-	-
1991	2 298	2 037	-	-	1	2
1992	1 323	1 336	-	-	1	2
1993	1 657	1 358	-	-	1	4
1994	2 394	2 041	256	693	2	11
1995	1 909	1 625	453	2 222	26	42
1996	1 612	1 223	463	2 009	9	23
1997	1 483	1 238	609	2 334	-	-
1998	1 192	1 167	144	637	-	-
1999	1 140	761	575	1 974	-	1
2000	700	550	590	1 750	-	-
2001	139	137	559	1 869	11	12
2002	395	363	574	1 657	45	40
2003	1 733	1 377	588	1 867	216	298
2004	1 708	1 269	260	994	166	165
2005	1 991	1 482	237	1 077	154	113
2006	2 163	1 755	309	1 277	68	70
2007	1 579	1 061	309	1 455	16	22

Year	Other molluscs including sea urchins sea cucumbers and other aq. invertebrates other than live fresh or chilled		Skipjack or stripe-bellied bonito frozen		Tunas skipjack and Atlantic bonito prepared or preserved		Yellowfin tunas (*Thunnus albacares*) fresh or chilled	
	4		5		6		7	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1981	-	-	13 790	5 240	-	-	-	-
1982	-	-	9 788	3 563	17	52	-	-
1983	-	-	7 853	3 891	43	115	-	-
1984	-	-	13 796	6 703	613	1 427	-	-
1985	-	-	17 091	8 816	722	1 522	-	-
1986	3	26	17 799	9 562	432	899	-	-
1987	33	342	13 671	8 562	1 919	4 188	-	-
1988	553	4 496	19 711	13 050	2 740	7 312	-	-
1989	410	1 749	19 689	14 211	5 535	11 145	-	-
1990	755	3 422	17 056	13 873	6 931	13 306	-	-
1991	417	2 125	10 085	7 526	7 188	15 382	-	-
1992	119	799	5 540	3 419	7 478	15 349	-	-
1993	72	594	9 869	7 358	4 877	9 238	-	-
1994	66	431	7 439	6 655	6 849	15 429	-	-
1995	94	707	3 022	2 715	7 781	16 139	-	-
1996	145	646	4 598	3 517	7 183	16 624	-	-
1997	318	728	6 871	5 663	6 826	16 342	-	-
1998	85	346	3 620	3 781	6 727	16 729	2 119	5 517
1999	54	407	9 498	3 737	4 565	8 624	512	969
2000	205	2 424	8 557	4 066	7 731	10 869	3 991	5 263
2001	226	2 805	10 653	5 575	7 212	9 815	1 190	5 215
2002	191	2 972	25 019	14 905	5 728	10 073	2 667	8 436
2003	239	3 371	37 276	20 354	7 384	12 836	3 658	10 072
2004	182	2 426	41 039	26 712	8 088	15 583	5 023	14 019
2005	118	1 812	46 752	33 722	7 877	16 942	4 241	14 733
2006	88	993	77 787	59 524	6 186	15 379	5 717	18 373
2007	113	855	40 599	42 181	4 099	12 328	4 442	14 845

Unit: Tonnes/ thousand US$
Source: FAO Fisheries Department, Fishery Information, Data and Statistics Unit.
FISHSTAT Plus: Universal softwere for fishery time series. Version 2.3.2000

BOBP/REP/113

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