

# Marine Research Centre, Maldives

**M**arine fisheries is one of the cornerstones of the Maldivian economy. From the earliest times, this small entity of coral islands (atolls) has thrived as a source of food, trade, livelihood and culture. Once known only for a traditional subsistence-based pole and line tuna fishery, Maldives today has a number of commercial fisheries and state-of-the-art processing units. The sector is a major source of jobs, and employs about 11 percent of the country's labor force. Nearly one-fifth of the total population depends on fisheries for incomes.

The Marine Research Centre (MRC) of Maldives was founded in 1984 as a research arm of the Ministry of Fisheries, Agriculture and Marine Resources (MoFAMR). Its mandate: to undertake research on living marine resources and to provide scientific advice on marine resource management and on the



*Marine Research Centre,  
Malé, Maldives*



state of the marine environment. Initially it was known as the Marine Research Section (MRS) of the Ministry of Fisheries and Agriculture. In 1998, it became a semi-autonomous Government institution.

During the first couple of years, the MRS carried out resource assessments and taxonomic studies on fin and shellfish species. The University of New Castle-upon-Tyne provided the main technical assistance. Funds were provided by the UK's Overseas Development Authority, now known as DFID (for studies on coral reef degradation); by the ICOD of Canada (for reef fisheries identification and cataloguing); by FAO/ UNDP

(for fisheries resource surveys); and by CSIRO of Australia.

The MRC assists the government, the industry and the public in decision-making on rational utilization of the country's marine resources. It also raises awareness on the marine environment through knowledge dissemination.

The MRC is mandated by the President to:

- Plan, coordinate and conduct scientific research on marine resources of the country.
- Undertake marine research directed at the conservation, enhancement and management of the marine environment in general and fisheries exploitation in particular.
- Publish research findings and reference materials and disseminate knowledge to promote public awareness about fisheries and the marine environment.
- Study ways and means to increase the fisheries sector's contribution to the national economy.
- Conduct resource surveys in selected areas within the country.
- Compile and implement a database containing data as well as scientific information on marine resources.
- Undertake research on technological innovations to promote the rational utilisation of marine resources, and introduce these technologies to the fishing industry.
- Undertake research on the rational utilisation of reefs and reef resources.

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Dr Adam's research specialty includes spatial management, and the movement and migration of large pelagic species. He takes active part in the international tuna tagging program being undertaken by the Indian Ocean Tuna Commission (IOTC). He is also a member of the steering committee for the International GLOBEC program CLIOTOP (Climate Impacts on Top Ocean Predators).

## Organisational Set-up

The MRC is located at Malé, capital of Maldives. It comprises four divisions dedicated to marine fisheries, coral reefs, aquaculture, and education and awareness. At the headquarters, the focus is on tuna research. MRC has a network of 13 field offices that continuously collect and collate data on the biological aspects of tuna and bait fisheries. Reviews are conducted every year for policy making. Coral reef research was initiated under the National Coral Reef Management Programme. The MRC has established 25 coral reef monitoring sites in the country from which data is collected twice a year to observe the growth and health of coral reefs.

The main activity of the Education Awareness Unit is to maintain the library and the museum. The library is extensively used and is armed with wireless local area networks (WiFi) ports and the Agora or hybrid library management system (HLMS). Presently, the library houses some 900 electronic journals related to marine fisheries science. Along with the library, the MRC headquarters attracts visitors to its museum which focuses on the marine resources of the Maldives and the evolution of its marine fishing fleet from small artisanal boats to large modern mechanised vessels.

Besides the headquarters, MRC has a research station located at Bodumohoraa Island in Vaavu atoll. The island is uninhabited. The station has a permanent staff strength of 17, including the research station manager. It presently is active with grouper and pearl culture. The station houses stocks of grouper spawners – they have been held for the last 18 months in an on-shore facility. A grouper hatchery is also located on-shore. Pearl culture was initiated in 1999 to promote alternative livelihood options under the second phase of the UNDP-assisted project. The species farmed is *Pteria penguin*; efforts are on to totally



*The Museum at the Marine Research Centre (above and below).*



close the life cycle. The objective of the programme is to set up a model raft system and collect biological information. The project is now being extended to Baa Atoll.

The MRC has three vessels, mostly used by field staff. One is a 65-footer, another is a 15-footer equipped with an OBM, the third is a 15-foot whaler. The MRC is now constructing a 85 ft. research vessel at an estimated cost of Rf. 4 million (0.36 million USD), for research in the sea. It will carry 14 researchers on board. Expected to be operational by mid-2008.

### Ongoing research activities

The MRC's research work at present relates to coral reefs, aquaculture and fisheries. Under coral reef management, MRC has undertaken ecosystem analysis and monitoring,

habitat monitoring, coral recruitment studies and economic valuation of coral bleaching impacts on tourism. On aquaculture, the organisation has undertaken aquatic animal health and feed management, aquaculture technology development and aquaculture program support service activities. Fisheries research comprises research on reef and pelagic fisheries.

### Coral reef research programme

A formal coral reef monitoring program was first implemented by MRC with assistance from the International Centre for Ocean Development (ICOD), Canada, in 1990. Since then reefs have been monitored for natural and anthropogenic impacts on an ad-hoc basis. The Centre, jointly with the



*The library of the Marine Research Centre, Maldives.*

University of Newcastle-upon-Tyne, is exploring the possibility of rehabilitating degraded reefs (as a result of coral mining) through the use of artificial reef structures of varying complexity. In particular, the project seeks to establish whether mobile rubble — which is characteristic of mined reefs — can be stabilised by artificial reef structures, and whether these structures can recreate the ecological conditions necessary to re-establish fish and coral populations on the reef flat. The programme is funded by the UK's Overseas Development Administration.

To manage the diverse reef system of the Maldives, MRC has initiated a GIS research programme to study and characterize reef types in Maldives by examining their geomorphologies through satellite images. The objective is to generate GIS-based resource and habitat maps that can be used for both environmental and reef resources management. Landsat 7 ETM+ satellite images are being used for this research.

MRC is the key institution responsible for implementing national and regional programs for the Global Coral Reef Monitoring Network (GCRMN), South Asia (<http://ioc.unesco.org/gcrmn/index.html>). National reef monitoring efforts have been complemented and strengthened

through integration with GCRMN from 1997.

The major coral bleaching event of 1998 in the Indian Ocean coincided with the commencement of GCRMN activities in Maldives. Carefully selected monitoring sites were established countrywide to understand the recovery of reefs in the aftermath of coral bleaching. Under a rigorous and standardized training scheme, biophysical changes in reefs and in the socio-economic conditions of user communities, have been monitored regularly during the past five years.

***Coral reef resource mapping, quantification and reef growth patterns***

Coral reefs are the mainstay of the Maldivian economy. Despite this high reliance on reefs, knowledge about the extent of reefs and their areas in individual atolls is slight. MRC is trying to bridge this knowledge gap by quantifying reef habitats and their resources using satellite and airborne imagery.

Coral reef area and size, sea grass beds, mangroves, reef lagoons, reef islands and other reef habitats are being accurately mapped and quantified so as to generate better estimates of resource inventories. The organisation has also undertaken research on probing the relationships between lateral reef growth and monsoon-generated hydrodynamic regimes.

Understanding such relationships is critical to assess how reefs will respond to rising seas and altered weather patterns because of global warming.

***Coral Reef Degradation in the Indian Ocean (CORDIO)***

CORDIO ([www.cordio.org](http://www.cordio.org)) is a program created in response to degradation of coral reefs throughout the Indian Ocean by the extensive coral bleaching and mass mortality of corals that occurred in 1998. MRC is the focal point for coordinating and implementing CORDIO activities in Maldives. CORDIO focuses on understanding the ecological and socio-economic effects of coral reef degradation in the Indian Ocean region.

***Fisheries Research***

A healthy bait fishery is a prerequisite for tuna pole-and-line fishing in the Maldives. MRC has carried out studies, with some local funding, on quantifying the bait usage and seasonal availability of bait. The MRC is at present studying the use of light at night to attract baitfish. An experimental FAD (fish aggregating device) deployed in an atoll lagoon -- rigged with timer-switches and lights to improve night bait fishing — has been shown to be effective in increasing the bait supply. MRC is currently evaluating the economic feasibility of this technique. It is also studying by-catch issues and the potential for interaction with the traditional method of bait catch.

A major impediment to bait-fishery research is the lack of means to regularly monitor the fishery at the national level. There is no provision to record information on bait catch in the established national tuna catch effort recording system. An effective mechanism to gather baitfish catch/ effort data on a routine or regular basis is urgently needed to help management.

***Grouper fisheries***

Commercial exploitation of grouper for live export started in 1993. During 2001, more than 350 000

groupers were exported, the value being nearly US\$ 4 million. An assessment of the fishery and holding facilities was carried out in 1994; it included recommendations to develop and manage the fishery. Some of those management recommendations, including registration of holding facilities and improved collection of catch statistics, have been implemented.

### ***Oceanic Resource Evaluation & Assessment***

The most recent reviews of the fishery were conducted in 1998. These covered all the major species in the fishery: Skipjack tuna (*Katsuwonus pelamis*), yellow fin tuna (*Thunnus albacares*), frigate tuna (*Auxis thazard*) and Kawakawa (*Euthynnus affinis*). Topics considered included CPUE trend analyses in relation to oceanography – fishery interaction, basic biology and ecology of the species.

The MRC has also conducted two very successful tagging programmes. The first was conducted during 1990-1991 and assisted by the former Indo-Pacific Tuna Management Programme (IPTP). The second was carried out during 1994-1995 under the IDA/ World Bank Third Fisheries Project's Technical Assistance component. The main aims of the tagging programs were to determine the movements of skipjack and yellow fin tuna within and outside the Maldives, to investigate fishery interactions, and to estimate growth rates of skipjack and yellow fin tuna. Analyses of the tagging programs data appear in various reports, conference papers and peer-reviewed journal papers.

MRC conducts regular sampling of the Malé Fish Market, the major fish-landing site in the Maldives. Sampling parameters include size and weight measurements of major tuna varieties (skipjack, yellow fin, bigeye, kawakawa and frigate tuna). MRC also helps to maintain and improve the quality of the tuna catch / effort data collection by training regional field officers and



by providing technical expertise to the statistics section of MoFAMR.

The MRC maintains records of sightings of cetaceans (whales and dolphins) and has an on-going stranding recording programme. MRC has been maintaining records of cetacean stranding since its formation. Special recording forms have now been distributed to every inhabited island. The MRC has also participated in several cetacean survey cruises and supported the Maldives stages of the round-the-world cetacean research conducted during the Voyage of the Odyssey ([www.whale.org](http://www.whale.org)).

### **Impact factor**

Along with its paternal organisation MoFAMR, the MRC has close ties with the Environmental Research Centre under the Ministry of Environment, Energy and Water, and the Ministry of Atolls, for carrying out activities in the islands and in the Educational Development Centre. The MRC is a household name in the Maldives through radio and TV programmes. More importantly, the Centre is known to fishers as a trusted knowledge and technical service provider.

Fisheries science in the country is taught in all schools at the secondary level. The MRC has contributed substantially to the development of textbook materials for schools. The MRC library serves as a one-stop resource for students for their school projects. The Code of Conduct for Responsible Fisheries is not included in the textbook, but the word 'conservation' is used frequently, it also appears in the Maldivian lexicon as *Zimaadaaru Masverikan*. What's important now

is to promote and internalise the Code of Conduct. The MRC is also well-positioned to give advance warnings on sustainable fisheries and on the environmental impact of global warming and other phenomena.

### **Major achievements**

The MRC catalogue on Maldivian fisheries is a significant achievement. It changed the thinking of Maldivian fishers. The monitoring and analysis of coral reefs is another important achievement. The MRC's work has raised public awareness on the importance of reef conservation and given the government research inputs for policy formulation. Setting up a field station for grouper and pearl research is another major achievement. The field station can contribute significantly to mariculture and alternative livelihoods.

### **The next step**

Having established itself in the Maldives, the MRC should now seek to become a leading institute in the region for research, advocacy, scientific and academic thinking. The MRC is therefore strengthening its human capital base and gearing up to take on more collaborative programmes on coral reef ecosystems. It is also planning to set up a microbiology and fish pathology laboratory at the Aquaculture Centre. However, the MRC is constrained by lack of funds. At present, the Government of Maldives finances the MRC. But stronger participation by donor agencies is needed to help MRC achieve its objectives.

The MRC is one of the constituents of the Technical Advisory Committee of the BOBP-IGO. The interaction is mutually beneficial. The Centre hopes to get wider exposure for its work through the IGO. It also expects BOBP-IGO to facilitate exchange of information among research entities in the Bay of Bengal region and to strengthen the MRC's education and awareness programmes.