



## Integrating Safety at Sea with Fisheries Management

*Bay of Bengal News examines the many dimensions of safety at sea, with facts, anecdotes and analyses, plus reports of consultations in Chennai and Rome. The main message: Governments should strengthen MCS, as part of their fisheries management regime. Expected outcomes: more reliable data, sounder laws, more knowledgeable fishers, firmer enforcement – and fewer accidents at sea.*



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# Integrating Safety at Sea with Fisheries Management



*Driven by need and emboldened by technology, small-scale fishers are risking their lives by going farther out to sea. Fisheries management – through a sound MCS (monitoring, control and surveillance) policy – is essential to strengthen fisher safety. MCS will control fishing effort, upgrade skills and knowledge, strengthen data, facilitate search and rescue, improve discipline.*

Late in October 2007, Perumal<sup>1</sup>, 46, and his fishing mate Selvaraj, 42 (Cuddalore district, Tamil Nadu) went fishing one morning. They were on their new beauty, a 27 ft FRP boat driven by a 10 hp engine. Discarded on the beach lay their older vessel, a five-log catamaran.

Ignoring a weather warning, Perumal and Selvaraj sought the rich haul of deeper waters. So did

fellow-fishers. Some 40 nautical miles from the coast, they were buffeted by stormy winds. The boat capsized. Perumal and Selvaraj clung for dear life to two plastic cans meant for water and spare diesel. They were rescued 20 hours later by a passing ship: battered, sick, shaken, sans boat.

Around the same time: In neighbouring Sri Lanka, Vincent, 36, and a crew of four set sail from

Negombo fishing harbor on “Shining Star” (a 15 meter FRP fishing vessel) on a three-week tuna-hunting voyage. They too made light of weather warnings. They made for the high seas between Nicobar and Sumatra islands, fairly well-equipped – VHF and SSB radio sets, some simple life-saving gadgets, food.

<sup>1</sup> Names of persons and places changed to protect identity.



But nature played spoiler: depression, storm, equipment breakdown. Result: A little vessel let loose in the vast ocean expanse for almost a month. Happy ending, however. Rescue by the Indian Coast Guard.

Perumal and Selvaraj spent a week in hospital, Vincent and crew spent a month. But they were lucky to survive. Not so, many other fishers from India and Sri Lanka.

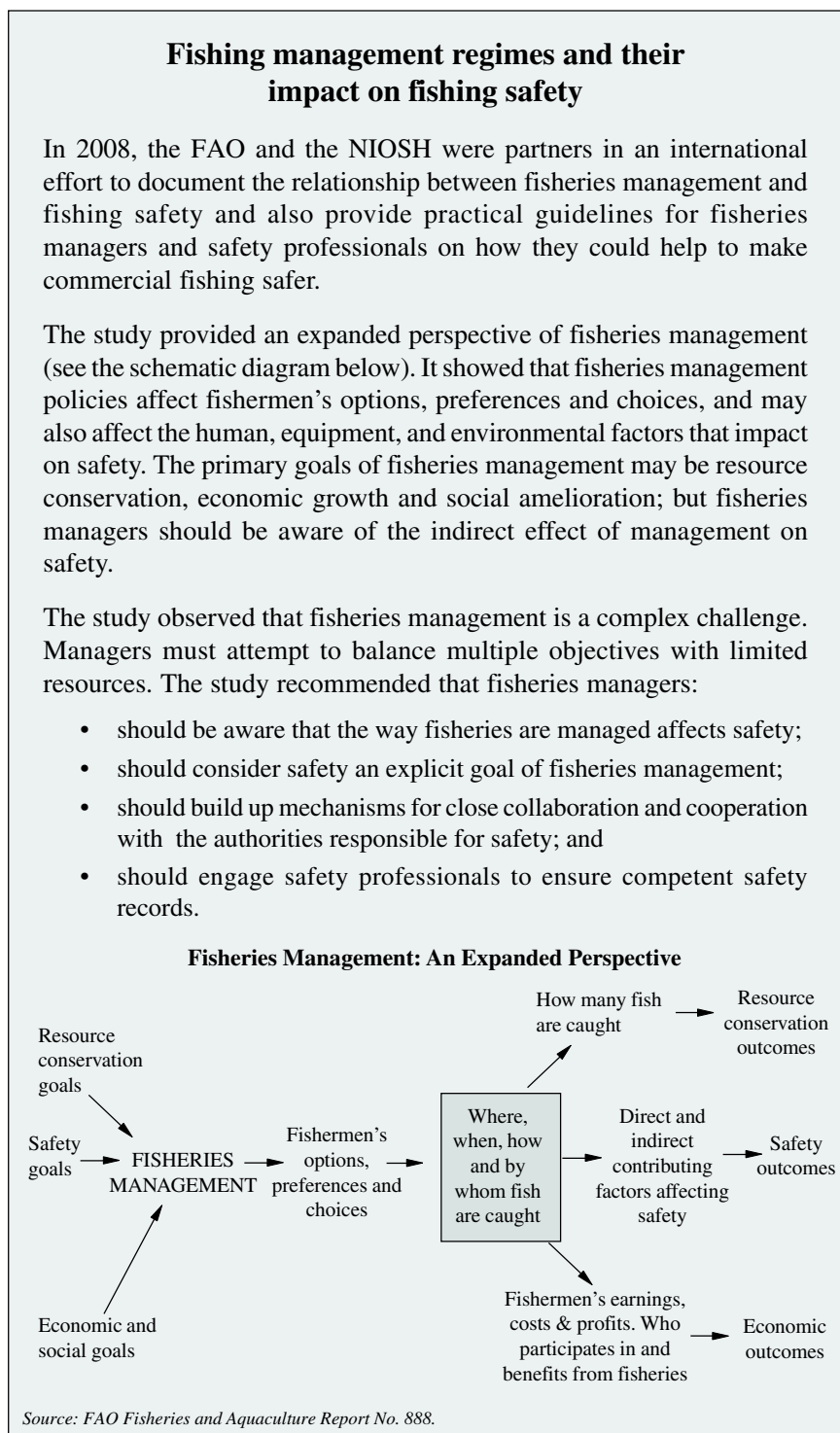
Such incidents in the waters of the Bay of Bengal raise several questions.

Are vessels like Perumal's and Vincent's meant (either built or certified) for deeper waters? Are they equipped with communication and life saving equipment? Is the crew trained in navigation, emergency repair and life saving? Do fisheries management policies incorporate safety concerns?

Let's look at some of these issues.

In many developing countries, fisheries is a major economic activity. It means food, livelihood, nutritional security, foreign exchange through export, it's a growth trigger in coastal areas. No wonder governments adopt growth-oriented policies. But the safety of fishers doesn't figure in their calculations. Many policies have actually aggravated the risk profile of fishers.

Growth oriented policy-making was fine when resources were aplenty and fishing effort was limited. Not the case today – the story is one of dwindling stocks and ever-expanding capacity. Further, technology has enabled even small-scale fishers to move off-shore or fish longer. And many imperatives of sound fishing have been neglected – sound boatbuilding practices, use of communication and personal protection equipment, training in navigation, engine maintenance and repair. Result: Marine fisheries development has got lopsided. Risks have gone up manifold. For Perumal and Vincent,



a day lived is a day of risks survived.

The solution? Devise fisheries management policies that strengthen safety. In a word: MCS or monitoring, control and surveillance. The Chittagong Resolution of 2008 passed by the BOBP-IGO's Regional Consultation on MCS urged member-countries to integrate MCS into fisheries policy and regulation, and make it a part of the management framework. It also

urged education, training and awareness programmes as a part of the process (*Bay of Bengal News*, Vol IV, Nos. 15-16, March –June 2008).

An FAO 2001 study revealed that MCS capability in the region ranged from 41 percent (Bangladesh) to 62 percent (Maldives). The study also concluded that different management paradigms impacted differently on fisher safety.

All the four member-countries of the BOBP-IGO have fairly large fishing fleets (ranging from 4 356 fishing vessels in the Maldives to some 2 40 000 in India) and large small-scale fisher populations. Management isn't simple. An open-access fisheries regime makes it tough and complex.

How can safety at sea be integrated with fisheries management?

Safety concerns over fishing at sea have emerged in an organized way only recently, thanks to the United Nations. Pioneering work on small-scale fishing vessels (FAO and IMO); worldwide acceptance of labour rights (ILO); the initiatives of regional fisheries bodies such as the BOBP-IGO (and its forerunner the BOBP). All these have raised the profile of safety issues, led to the formulation of standards and guidelines, and spurred debate on action to reduce fishery-related accidents.

Developed countries such as the United States have set up systems for time-series data on the causes of fishing-related accidents (in Alaska in particular). Fishing has consequently become a much safer occupation in the U.S. Data in these countries shows a fall in injuries and fatalities, but there's scope for further improvement. In developing countries, however, reporting on accidents at sea is poor, so also understanding on the subject. A mechanism for monitoring and recording fishing-related accidents is essential.

A sound MCS would:

- enable regulation of access to the fishery resource through proper licensing and registration of fishing vessels;
- control fishing effort, if required;
- provide zoning for different categories of fishing vessels depending on their size, capacity and endurance to fish in different depths;



- make possible closed fishing areas and closed fishing seasons;
- ensure maintenance of log books and movement registers;
- coordinate and streamline search and rescue operations in times of distress; and
- in essence, bring much-needed discipline into fisheries.

Safety-at-sea is a multidimensional issue. It should therefore be regarded as integral to fisheries management. It shouldn't be bundled together with welfare programmes for fishers, in the form of compensation after accidents.

Some other points:

- Adopt a precautionary approach to safety, by ascertaining the causes for accidents, then deciding on interventions;
- Raise awareness, bridge gaps in knowledge and skills, involve fisher families in creating a 'safety culture' in the day-to-day life of fishers;
- Promote asset- building among small-scale fishers;
- Promote and strengthen insurance practices in fisheries (both life insurance and asset insurance – assets such as craft or gear); and
- Discourage risk-taking behaviour by fishers.

Fishers seem to revel in risk and adventure – an attitude that imperils personal safety. Perumal and Vincent are examples. Integrating safety with fisheries management is a challenge complex but not insurmountable. What should policy-makers strive for? Higher fish production alone? Or a sound, sustainable and stable sector, with reasonably safe and secure fisherfolk?

– Y S Yadava

*Paintings by school children in India, Maldives and Sri Lanka depicting post-tsunami reconstruction.*

# Conservation and development of fish genetic resources – Mission of the National Bureau of Fish Genetic Resources

**T**he National Bureau of Fish Genetic Resources (NBFGR) based in Lucknow, is India's premier organization devoted to conservation and sustainable development of fish genetic resources.

Set up in December 1983 in Allahabad and moved to Lucknow in 1994, the NBFGR taps cutting-edge technologies and mobilizes national co-operation to:

- collect, catalogue and document fish genetic resources;
- maintain and preserve fish genetic material to conserve endangered fish species;
- evaluate indigenous and exotic fish species; and
- ensure Intellectual Property Protection relating to fish genetic resources.

## The infrastructure

The 52-hectare complex on which NBFGR stands (inaugurated by Prime Minister Atal Behari Vajpayee in June, 1999) houses laboratories; farm facilities (broodstock rearing ponds, nursery ponds, breeding ponds, a live fish gene bank, data banks); an Information Technology provider known as ARIS (Agriculture Research Information Service) cell which contains hardware, software and networking facilities and a Geographic Information System or GIS lab; an Intellectual Property Rights training cell; an extension and training cell; a fully automated library that provides electronic

access to several databases and to top journals in agriculture, plant sciences, fisheries, aquaculture and ecology.

An International Centre for Fish DNA Barcoding was established in 2006. A microbiology lab was developed and equipped for disease diagnostics. An Aquaculture Research & Training Unit focuses on quality fish seed production technologies and on training both farmers and department personnel. It is presently being upgraded, with

a special emphasis on catfish, carp and freshwater prawn.

Other infrastructure includes an aquarium, a hatchery complex and a fish museum, to be expanded into a National Fish Museum. Besides, a research unit of the NBFGR was set up in Cochin in 1994 at the Central Marine Fisheries Research Institute, Kochi.

NBFGR is run by a staff of 79 including 26 scientists, a research manager and 26 technical support personnel.



Director of the National Bureau of Fish Genetic Resources, Lucknow, Dr W. S. Lakra has implemented several innovative programmes in aquatic genetic resources conservation including DNA barcoding of fish and marine life and the concept of a 'State Fish'.

A graduate of Delhi University, with an MSc and PhD from H.N.B. Garhwal University, Dr Lakra has been principal scientist and head of the department of genetics and biotechnology at the Central Institute of Fisheries Education, Mumbai, where he helped initiate India's first master's and PhD programmes in fish genetics and biotechnology. He also helped establish a Centre of Fish Molecular Genetics and Biotechnology. He organized several HRD programmes in fish biotechnology and the first national conference on the subject in 2000.

Dr Lakra has authored or edited 20 books, published more than 120 research papers and guided several research students.

Widely traveled, he has visited Canada, Norway, France, Australia, China, Singapore, Bangladesh, Korea, Malaysia, Thailand and Taiwan. He has been an expert member of the international review team for the genetic improvement and biodiversity programme of the WorldFish Centre, Malaysia. He has made significant contributions in fish genetics, biodiversity conservation and aquaculture biotechnology through research, teaching, extension, research management and infrastructural development.

Dr Lakra has won several honours, including the M. S. Swaminathan Best Indian Fisheries Scientist Award. He is founder president of the Aquatic Biodiversity Conservation Society and regional chair of the Global Consortium of Barcoding of Life (CBOL).



## ***The why and how of NBFGR***

Before describing the achievements of the NBFGR, which is now about 26 years old, one first needs to clarify the scientific and development rationale of a knowledge-intensive, technology-intensive and research-intensive organization like the NBFGR, and its methodology.

**Rationale:** Fisheries and aquaculture are crucial for India's food production and food security. Fisheries and aquaculture also relate directly to poverty alleviation and economic uplift – since thousands of fisherfolk and farmers depend on fisheries for their livelihoods. Fisheries and fish products also feed the pharmaceutical industry and other industries.

But fish resources everywhere – not just in India and worldwide – seem to be dwindling and are under pressure. Some resources are in danger of extinction. Making fisheries sustainable demands better planning, sounder management strategies, and better knowledge of India's rich aquatic biodiversity.

A majority of the genetic resources for food still come from the wild, because of the low domestication level in fisheries, in contrast to animal farming and agriculture.

Threats to our aquatic biodiversity are many and varied – over-exploitation of resources, habitat alteration, construction of dams, introduction of non-native species etc.

Conservation and management of India's fish and aquatic resources call for holistic approaches to knowledge and to documentation, hence the relevance and role of the NBFGR.

## **Methodology**

NBFGR carries out multi-disciplinary research, develops research tools and disseminates information – in biology, genetics, molecular biology, biotechnology, etc. It studies habitats and inventories the resources. It taps remote sensing and GIS



applications. Result: databases that strengthen knowledge and provide insights on our fish and aquatic resources.

## ***What are the achievements of NBFGR?***

### **1. Development of databases**

A database has been developed on India's fish diversity, comprising information on 2 245 indigenous and 291 exotic finfishes.

The database provides information on a) classifications, b) nomenclature: scientific name, synonyms, local names in different regional languages, common name in English, c) distribution in India and abroad (global distribution), d) habitat: coldwater, warmwater, brackishwater and marine, e) commercial importance: food fishes, sports fishes, ornamental fishes, cultivable fishes, etc, f) maximum and minimum size, g) morphological features including key identification features like fin formula, h) status: endangered, vulnerable, threatened, rare, indeterminate (based on IUCN criteria), and i) images: studio photographs, diagrams and digital.

Every finfish has been given a distinctive five-digit code. The first three digits relate to the genus, the last two digits show the species. Thus each species has a unique code. All the information related to a particular species can be retrieved by this unique code.

The database is being updated for shellfishes. The present information covers 1 655 molluscan, 923

crustacean, 43 echinoderm and 350 species of marine ornamental fishes. Information has also been collected on marine shellfishes of India – prawns, lobsters, crabs, gastropods, bivalves, cephalopods, turtles, crocodiles, whales, dolphins, porpoises, sea cows, sponges, corals, sea cucumbers, sea urchins and seaweeds. Work is in progress to incorporate genetic information as an important component of the database. The work is also being extended beyond the taxonomic diversity of fishes.

Under a collaborative programme, 31 new fish species from the northeast and the Western Ghats have been identified and described. More unexplored regions are to be surveyed to describe germplasm resources in future. Attempts are being made to develop databases on a GIS format. Policy makers envisage a database that will provide integrated information concerning habitat, distribution and other available information.

## **Database: 'Fish Chromosome World'**

A database named 'Fish Chromosome World' in digital interactive format has been published by NBFGR. It contains karyomorphological information on 126 finfish species from 34 families and nine orders. The fish species and its locality are classified, information is provided on the chromosome number, the chromosome formula, authors and references. Photographs of metaphase spreads and/or

karyotypes of fish species are provided. The database can be accessed on NBFGR's official website [www.nbfgr.res.in](http://www.nbfgr.res.in).

## 2. Genetic Characterization

### DNA Barcoding of Indian fishes

With the help of sophisticated equipment acquired for genetic characterization (major facilities include an automated kary typer, a DNA sequencing and genotyping system), the NBFGR has initiated a comprehensive programme on DNA barcoding. This is a species identification programme – being developed for the first time in India – for all marine and freshwater fishes of India.

The work on DNA barcoding of Indian fishes was initiated in July 2005, at NBFGR, as the lead centre for the Indian region working group of FISH-BOL. An international training programme on “DNA Barcoding of Marine Life” was conducted at NBFGR from 16 to 21 April 2007. Trainees and resource personnel from Canada, Australia, Kenya, Tanzania and South Africa participated.

Under the DNA barcoding programme, comprehensive sample collections are being obtained. DNA barcodes were prepared for 742 sequences (DNA barcodes) of 244 species.

### Genotyping and Genetic Diversity Analysis

The NBFGR identifies appropriate genetic markers which make possible the quantification of genetic variability at intra and inter-specific levels. Expertise has been developed for various classes of markers – cytogenetic, allozyme, DNA including RAPD, mtDNA, RFLP – and microsatellites. These markers are used to generate information and data on prioritized fish species to study inter-specific and intra-specific variation.

### Species-specific diagnostic markers

Unambiguous description of a species is important for

conservation. Molecular markers are invaluable tools to complement conventional tools in resolving taxonomic ambiguities. Species-specific diagnostic markers have been developed to detect hybridization and introgression in Indian major carp hatchery and wild populations. The markers included allozyme and mtDNA haplotypes.

NBFGR has a very strong cytogenetic data base for about 200 fish species and stocks within species which will help to resolve ambiguities between different species or varieties. This in turn will help plans for conservation strategies of endangered species and their utilization in fish breeding programmes.

NBFGR has characterized several fish species such as *Labeo rohita*, *Catla catla* and *Cirrhinus mrigala*; endangered mahseer species, including *Tor khudree*, *T. mussullah*, *T. tor*, *T. putitora*, *Schizothorax richardsonii*; and commercially important catfishes like *Clarias batrachus*, *Heteropneustes fossilis*, etc. Variations have been reported for the first time between *Clarias batrachus* and exotic *C. gariepinus* using cytogenetic markers like C- and NOR banding.

### Molecular markers in endangered and commercial fish species

At intra-specific levels, variations are assessed within and between populations. Such studies provide



precise information on the stock structures of prioritized endangered and commercial fish species. This is vital for planning rehabilitation of endangered fishes and for genetic improvement of cultivable species.

Research on two important Indian major carps, *Labeo rohita* and *Catla catla*, indicates a substructure population for these two species. The study has identified genetic stocks of rohu and catla across its natural range of distribution in India using allozyme and microsatellite DNA markers.

### Genotoxicity assays

An increasing number of genotoxic chemicals like pesticides and heavy metals are being released into the aquatic environment. These imperil not merely aquatic biodiversity but human health as well. The Bureau has developed strong skills for studying the genotoxic effect in fishes through a battery of test systems like the micronuclei test, the chromosome aberration test, the sister chromatid exchange (SCE) assay and the comet assay. Such studies not only help determine the safe level of genotoxicants in water bodies but also help remedial measures to conserve our rich aquatic biodiversity.

### 3. In situ conservation

The *in situ* conservation programmes of the NBFGR cover protected areas and fish sanctuaries, the traits of prioritized species, evaluation of the impact of exotic fishes on natural populations, development of assays for genotoxicity, etc.

Such conservation efforts cannot be meaningful without people's participation through mass awareness programmes. Local bodies and fishing communities must be sensitized about conservation programmes.

### ‘State fish’: A novel approach to fisheries conservation

Under this initiative, the Directorate of Fisheries of each Indian state was encouraged to adopt one fish

species as a 'State Fish' on the lines of the National Animal/National Bird. So far, 15 states have responded to this initiative with 'State Fish' declarations. The idea is that conservation of these species will be researched and reviewed as a matter of priority, with technical help available from NBFGR. An operational farm in each state will be devoted to the 'State Fish' for developing a gene bank and broodstock and propagation protocol. Eventually, strategies can be developed for field level conservation programmes.

### **Life history traits of natural populations of prioritized fishes**

Studies on life history traits of fish populations are essential for planning conservation and management of a species. Such studies have been scanty so far. Parameters like fecundity, size at first maturity, gonadosomatic index, age and growth, length-weight relationship, oocyte size frequency profile, food and feeding habits, etc. are crucial for examining any stock. Of the 587 freshwater species reported in India, more than 100 species have potential for culture. NBFGR is conducting studies to generate life history data of endangered and commercially important fishes in the North East and in the Western Ghats, to facilitate sustainable management and conservation.

### **Fish sanctuaries and protected areas**

Very few sanctuaries for aquatic resources – necessary for *in-situ* conservation – exist today. Aquatic sanctuaries including marine protected areas would not only help conserve biodiversity but also rejuvenate fisheries.

### **Captive propagation of threatened fishes**

Captive breeding programmes are a principal tool to compensate for declining fish populations, and supplement and enhance yields of wild fisheries. Culture, breeding and larval rearing technologies have

been practiced for decades for major carps, but they do not exist for many other freshwater fish species with commercial potential.

At NBFGR, efforts to develop protocols of captive breeding and larval rearing for non-conventional species in collaboration with fish farmers have shown remarkable success. This may pave the way for commercializing the technology and transferring it to fish farmers, fish traders and fish entrepreneurs.

### **Community participation in conservation**

India's northeast is a hot spot of freshwater biodiversity. The natural resources of northeast states harbour 267 fish species – approximately one third of India's freshwater fishes. It is essential to prevent unlimited exploitation of untapped wild germplasm resources and put in place a strategy for sustainable utilization of resources. NBFGR has undertaken a comprehensive project for development and conservation of fisheries in the northeast states with community participation.

### **4. *Ex situ* conservation and gene banking**

Gene banking is a powerful *ex situ* conservation tool. NBFGR is the primary organization in India for fish gene banking programmes. These are made possible through a repository of biological materials and a live gene bank. This envisages the development of fish sperm cryopreservation protocols and collection of tissue accessions and voucher specimens from Indian fish species.

### **Fish sperm cryopreservation**

Species-specific sperm cryopreservation protocols have been developed for 17 species. Continuous improvement in protocols has provided hatching success ranging from 65 percent to 100 percent of the control value for different species.

### **Tissue banking**

A new thrust is being given to tissue

banking, which enables long-term storage of material. Tissue repository accessions are being made with an emphasis on the endemic fish resources of hot spot areas such as the Western Ghats and the northeastern states. Nearly 12 000 tissue accessions for fish species, collected across the country, are maintained in the tissue bank. NBFGR plans to establish linkages so that the tissue bank houses accessions of all the fish germplasm resources.

### **Live Gene Bank**

A live gene bank has been established at the Bureau in Lucknow comprising *T. putitora*, *Barilius spp.*, *Garra spp.*, *Labeo dayochilus*, *L. calbasu*, *Wallago attu*, *Chitala chitala*, *Channa marulius* and *L. Bata*. At the regional level, two live genebanks have been established in Guwahati. More species are being introduced in the system so that a suitable package of breeding and cultural practices can be developed.

### **5. Exotics and Quarantine**

The use of exotic species for fisheries and aquaculture diversification has been practiced since the middle of the 19<sup>th</sup> century. Many such introductions have been successful; but some others have resulted in highly publicized failure and generated controversies over the protection of native biodiversity and the spread of pathogens and disease.

Quarantine and health certification programmes form an integral part of broad strategies at national and international levels to protect the natural environment and native fauna from the deleterious impacts of exotic species or pathogens. NBFGR is upgrading facilities and expertise to safeguard indigenous fish genetic resources from exotic diseases and to develop effective protocols for fish quarantine,

The microbiology laboratory of NBFGR has developed rapid diagnostic capability for detecting the 11 eleven fish OIE-listed



pathogens using molecular and immunological tools. NBFGR has achieved success in developing monoclonal antibodies against *L. rohita*. A programme to develop fish cell lines from Indian carp and catfish species has been undertaken at NBFGR. Significant success has been achieved in developing cell cultures from *C. gariepinus* and *L. rohita*. These efforts can lay the foundation for a dedicated facility to screen import and export of live aquatic animals for exotic pathogens as well as pathogens of national concern and for health certification relating to all import and export of live aquatic animals.

NBFGR actively disseminates research tools and information to researchers and students. Besides publishing original research papers in peer-reviewed journals, national as well as international, NBFGR has been regularly conducting training programmes in fish biotechnology, molecular marker development and analysis, genotoxicity assays and disease diagnostics and reporting.

#### ***How has NBFGR helped contribute to Food safety and security?***

Molecular Diagnostic Capability to identify the 11 OIE-listed Fish and Shellfish Diseases/Pathogens has been developed at the NBFGR. This will help in border and post-border quarantine of live aquatic animal import consignments.

Fish traders are now more conscious of risks associated with the import of exotics. Guidelines for Aquatic Exotics Introduction have been approved by the government. Trans-boundary movement of live aquatic animals has become safer, and a better scientific decision support system now exists to evaluate proposals for import and export of aquatic animals through databases and molecular diagnosis.

Awareness programmes organized recently by NBFGR in Chennai and Mumbai on fish introductions and quarantine have sensitized people in

both the public and private sectors to the harm to biodiversity that haphazard introduction of alien species can cause.

#### **Human Resources Development**

The technologies and techniques developed by NBFGR are being disseminated to end users through training, demonstrations and publications.

Many training programmes have been organized on techniques developed in the laboratories relating to taxonomy, molecular markers, genotoxicity assays, diagnostic detection and confirmation of OIE diseases. Researches from ICAR and other institutes, from universities, colleges and fisheries departments have benefited from these programmes.

Technologies on culture and management practices are being disseminated to state fisheries officer and also directly to fish farmers.

#### **Impact on policy-making in fisheries and aquaculture**

NBFGR is not a capture or culture based fishery institute. Its technologies are an outcome of its work on germplasm conservation. Its clients are scientists and fisheries officers of state governments, the Ministry of Agriculture, the general public and to some extent, fish farmers. A few examples:

**Scientific inputs on exotics and quarantine:** Inputs were provided to the Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, on the proposal for import of ornamental fish *Betta splendens* (fighting fish) from Malaysia, the import of 18 species of ornamental fishes by a Tuticorin-based firm, and of 23 species by a Chennai-based firm, the introduction of exotic shrimp brood stock *Litopenaeus vannamei* by two private firms, and on MPEDA's proposals for import of 39 ornamental fishes to India.

This year NBFGR was identified as the nodal institute for all matters concerning introduction of exotic fish germplasm. State governments have been advised to furnish quarterly aquatic animal disease reports to NBFGR, who will process, compile and prepare reports to be submitted to OIE.

#### **Preparation of National Strategic Plan:**

A National Strategic Plan on 'Exotics and Quarantine of Aquatic Animals' and Guidelines on 'Introduction of Aquatic Exotics and Quarantine' prepared by NBFGR have been approved by the Ministry of Agriculture.

#### **International partnerships and collaborative programmes**

The NBFGR collaborates with several international organizations. For example, with the Worldfish Centre, Malaysia on fish germplasm. With the Natural Resource Center, Australia and Auburn University, USA, on molecular markers and genetic characterization. With the US Fish and Wildlife Service on capacity-building in *in situ* conservation programmes. With the WIPO, Switzerland, on International Property Rights.

#### **The future of NBFGR**

In the matter of conservation of natural resources, while the developed countries enjoy the technological edge, it is the developing countries that have the resources. Transboundary exchange of germplasm and information for use in product development are essential.

Explorations from new areas such as the deep seas and biodiversity-rich areas like the northeast and the Western Ghats are likely to result in the discovery of new fish species. A national repository of fish genetic material needs to be established and a national fish museum.

To tackle the problem of the dearth of qualified fish taxonomists, the NBFGR proposes to establish a Center of Excellence on Fish Taxonomy and Molecular Genetics.

# Regional Consultation on Safety at Sea in Chennai, India



Forty-three persons from Bangladesh, India, Maldives, Sri Lanka, FAO, IMO, NIOSH, fisheries institutions, and NGOs, besides a few expert consultants, took part in the Regional Consultation on Safety at Sea for Small-Scale Fisheries, held in Chennai on 7 and 8 July, 2008. It reviewed the progress of the South Asian component of the global project on 'Safety at Sea for Small-Scale Fisheries in Developing Countries - GCP/GLO/200/MUL'.

The consultation was funded by the Swedish International Development Cooperation Agency (SIDA) and organized jointly by the FAO, the International Maritime Organization (IMO), the Alaska Centre of the National Institute of Occupational Safety and Health (NIOSH) and the BOBP-IGO.

Mr M K R Nair, Fisheries Development Commissioner, Government of India chaired the consultation.

Welcoming participants, Dr Y S Yadava, Director of BOBP-IGO, said the consultation would review the progress of the South Asian component of the global project on Safety at Sea, which is being implemented in Bangladesh, India, Maldives and Sri Lanka by the FAO in association with the BOBP-IGO. The Project also includes an IMO component that focuses on the development of safety standards for the design, construction and equipment of fishing boats in India and Sri Lanka – where many boats were damaged by the December 2004 tsunami.

Dr Yadava said that 24 000 deaths from fishing at sea occur every year, based on the statistics from developed countries. The figure for developing countries is not known, but could be much higher. He said

the global Project on Safety at Sea is aimed at improving the safety of small-scale fishers at sea through awareness and training and safer boats. Another component (being implemented with NIOSH funds) seeks to improve the reporting mechanism to facilitate planning interventions. He thanked FAO, SIDA, NIOSH, IMO and the Government of India for facilitating the consultation.

Mr Jeremy Turner, Chief, Fishing Technology Service, FAO, referred to recent global trends in fisheries. He said that the number of fishers as well as fishing capacity had declined everywhere in the world except Asia. This increase did not auger well for the fishery resource. Reducing fishing capacity was an urgent need. Safety at sea was a complex challenge and needed to be addressed from different angles. He hoped the consultation would contribute to the project's success in South Asia.

In his welcome address, Dr Gavin Wall, FAO Representative in India, explained the role of the FAO in agriculture in general and fisheries in particular. He said that some

three billion people live within 60 km of coastline; of these, some 40 million are involved in fishing. He described the FAO as a knowledge manager – it collects, analyzes and disseminates information from a global perspective to help sustainable and responsible management of agriculture and fisheries. FAO also assists technological developments in member-countries, like building value chains from producers to consumers. Community-based fishing models are now the focus of research. The aim is to promote infrastructure, planning and diversification to add to value and improve livelihoods," said Dr Wall.

Expressing his happiness over a programme that concentrated on safety at sea, Mr Nair said that small-scale fishing vessels are ill-equipped and vulnerable to accidents. Most accidents occur due to faulty vessel design, human error and natural calamities. International instruments on safety at sea do not cover small-scale fishing vessels. He urged a holistic approach to



*Dr Gavin Wall, FAO Representative in India delivering the welcome address.*

tackle the problem of safety at sea for small-scale fishers and hoped that the consultation would help progress in this direction.

### Technical presentations

The Technical Session included 12 presentations on activities of the Safety at Sea Project, both global and regional; integration of safety at sea into fisheries management; draft guidelines on safety of fishing vessels below 24 m overall length (OAL); training needs of fishers; community mobilization; the status of legislative support to small-scale fisheries management in the four project countries.

Mr Jeremy Turner made the first presentation on “Safety at Sea as an Integral Component of Fisheries Management”. He said a vicious circle exists, where increasing fishing effort leads to depleted stocks and reduced catch per unit of effort. This forces fishers to increase capacity. In the process, they enter into a debt trap. Fishers are also trying to diversify into new fishing techniques for which they are ill-trained and ill-equipped, and are cutting costs and endangering safety. Fishers in general are overworked and fatigued – these are some of the main causes of accidents at sea. The solution lies in safer boats with regulations, training, enforcement and compliance, said Mr Turner.

There are two kinds of fishers who circumvent or ignore safety regulations, said Mr Turner: the greedy ones, who must be regulated, and those who cut costs for economic reasons, who would otherwise comply with feasible regulations. Explaining who fisheries management can address safety issues, Mr Turner said that 12 years ago Alaska had one of the highest fatality rates in fishing. But with a new fishery management regime, the accident rate fell dramatically.

He stressed the importance of information on the causes of accidents. Such data could be



*Mr Jeremy Turner*



*Mr Per Danielsson*

publicized to educate fishers and raise their awareness. Further, conditions should be created to improve safety. Better management would improve economic viability, which, in turn could enable stronger safety measures, said Mr Turner. He pointed out that regulations were meaningless without enforcement and compliance. Fishers, fisher families and other interest groups should be involved in formulating regulations.

Mr Per Danielsson, coordinator of the global project on Safety at Sea for Small-Scale Fishers, gave an idea of the global context of the Project. He said its immediate objective was fewer accidents at sea. Long-term objective: to improve the livelihoods of coastal populations.

He said the project was being implemented in South Asia (Bangladesh, India, Maldives and Sri Lanka) and West Africa. In South Asia, the project was expected to improve the system of reporting and analysis of accidents at sea; improve rules and regulations for safety of small-scale fishing vessels in line with the FAO/IMO voluntary guidelines; and better the integration of safety at sea and fisheries management.

Mr R Ravikumar, Regional Coordinator of the South Asian component of the Safety at Sea Project, said that the safety guidelines developed by the erstwhile BOBP for Sri Lanka – after boats there started operating multi-day trips in excess of their capabilities, resulting in accidents – were valid even today. The present Project aimed at pilot-scale activities to build awareness and develop some technical guidelines. Experiences gained could help formulate a larger project to promote safety at sea.

Mr Ravikumar said that the weather, the design of vessels, fishing regulations and human behavior were the factors that affected safety at sea. “Lack of a safety culture, willingness of fishermen to accept risks because of open access, forsaking safety for money, and lack of a structural approach for establishing safety norms were some important human factors. Stakeholders concerned with safety at sea are fisher communities, boatbuilders, national agencies and the coast guard.”

He said the immediate requirements were to review baseline data, assess knowledge gaps and prioritize awareness building. Thereafter, a media campaign would be designed and committees set up for monitoring. The awareness materials developed so far related to safety precautions, pre-voyage and post-voyage checklists, internationally accepted distress signals, engine checklists and a video on maintenance of small diesel engines.

A training course curriculum was being developed. It aimed at training fishers to adapt to a rapidly growing modern fleet. The poor quality of fiberglass boat construction in India and Sri Lanka had to be addressed, by training boatbuilders in good FRP practices and ensuring that boatyards adopt working conditions and quality control practices, said Mr Ravikumar.



Expressing his concern about owner-labour relations in marine fisheries, Mr Ravikumar said that owners often fixed targets for the boat crew to meet, without considering safety needs, especially in adverse weather conditions.

Asked how the project would train illiterate fishers, Mr Ravikumar said that fishers couldn't be expected to stop fishing to attend safety classes. The project therefore intended to train a cadre of trainers including some progressive fishers, who would in turn train the fishers.

Dr G Conway, Director, National Institute of Occupational Safety and Health (NIOSH), Alaska Centre, described the "Need for Surveillance and Reporting of Fishing-related Accidents at Sea". He said that in the early '90s, Alaska tied with Iceland in having the most dangerous fishing industry. But the situation improved greatly in a span of 5 to 6 years, and no deaths were reported in 2005. The lessons from Alaska were valid elsewhere. "The first step is to know the problem and address it in the most effective way possible". He presented a model format for surveillance and data collection.

Mr Oyvind Gulbrandsen, naval architect and consultant, presented the proposed "Guidelines on Safety of Fishing Vessels below 24 Meter Length".

He said that maritime safety began with the British Parliament amending the 1871 Merchant Shipping Act to end overloading of cargo in ships. Insurance companies demanded that boats be built to certain standards. But these safety regulations applied only to larger vessels. International standards and regulations on boats less than 24 meters overall length evolved only during the last 30 years, mainly due to the increasing use of FRP for small boats in Europe, the growing number of accidents caused by poor design and construction, and the need for uniform standards all over Europe.



*The Regional Consultation in progress.*

"Poor quality equates to unsafe boats", said Mr Gulbrandsen. He added that many fishing vessels capsized in inclement weather due to shortcomings in their design. Distress communication was poor or non-existent and fishers often did not receive storm warnings.

He pointed out that in most Indian boats, fishers still do not carry a radio. Inflatable life rafts are expensive; rigid life floats acting as buoyant apparatus are ideal substitutes, he said. In the late 90s, a rigid FRP life float was designed as an alternative to the inflatable life raft under a Technical Cooperation Project of the FAO in Andhra Pradesh, India. Some 100 such floats were distributed to trawlers in the State, said Mr Gulbrandsen.

If rules in BOBP-IGO member-countries were not properly enforced, initiatives like the present Project would have little meaning, Mr Gulbrandsen cautioned. An independent authority (the Coast Guard in some countries) was needed to implement and enforce safety regulations. He said that fishermen should not be singled out and targeted for compliance with safety regulations; boat owners and boatbuilders should also be targeted.

In discussions that followed the presentations, a representative of the Indian Coast Guard said that there were no regulations to stipulate carrying of life saving

appliances on board seagoing fishing vessels. Dr Yadava said that such stipulations did exist in the Marine Fishing Regulation Acts of coastal States, but were not effectively enforced.

Mr Turner remarked that the real challenge lay not in preparing rules and regulations but in enforcing them. Involving the community in enforcement may help solve the problem. Realizing this, the state governments in India are handing over management of some of the fishing harbours to stakeholders. But the sheer number of fishing vessels, especially smaller ones, poses a formidable obstacle, said Mr Turner.

#### **Country presentations on the status of legislative support to small-scale fisheries management**

The delegate from Bangladesh said that fisheries legislation in Bangladesh largely aims at resource conservation. The Marine Fisheries Ordinance, 1983 makes a license obligatory for sea fishing. Other important policy documents: the 1998 National Fisheries Policy, the 2000 National Fisheries Strategy, and accompanying sub-strategy and action plan. A committee has been formed to adapt the 1995 FAO Code of Conduct for Responsible Fishing to Bangladesh.

The delegate from India said that that Part XV A of the Merchant Shipping Act, 1958 and amendments to it, enjoined fishing

vessels to carry at least two life buoys, one life jacket per crew, EPIRB, SART, life raft and fire fighting appliances. A draft manual on Convention for Standard of Training, Certification and Watch keeping for Fishing Vessels (STCW-F) has also been finalized. It awaits government approval. He said that enforcement of safety regulations in India is weak.

The delegate from Maldives said that the Coast Guard conducts safety inspections once or twice a year. It works in cooperation with the local Atoll Administration and the Federal Government. Safety regulations were promulgated in 1984 but strict enforcement commenced only in 2000. These have been welcomed by fishers. The Government makes regular weather forecasts available to fishers in association with a US-based agency. It has trained some 200 fishers in downloading and using weather information. Fisheries cooperatives are getting popular in the Maldives.

The Sri Lankan delegate said that life-saving appliances are not yet mandatory in fishing vessels. But multi-day fishing boats get a 24-hour high frequency communication network service, and are equipped with SSB radio, while 22 land stations around the island provide weather forecasts. Sri Lanka has also undertaken a programme to build community awareness on safety at sea.

### **Management and Training Issues**

Dr Y S Yadava made a presentation on "Linking Fisheries Management and Safety at Sea". Analyzing the prevailing fisheries management regimes in BOBP-IGO member-countries, he identified gaps with respect to safety. He said that motorization of traditional crafts in India, had increased risks for fishers. Safety is a micro concept, it isn't properly addressed by macro policies, he said. The way boat owners and crew react to policy measures must be studied. The capacity of the community should be built through the precautionary



approach to management and awareness campaigns, Dr Yadava said.

Mr Roger Kullberg, Fisheries Officer, FAO made a presentation on "Training needs of Small-Scale Fishers in Safety at Sea". He explained the three lines of defense to prevent fatalities at sea. "Prevention is the first defense. It is the most effective and the cheapest. Next is survival and self-rescue. The third, search and rescue (SAR), is the least effective and the most costly. Training must be tailored to the needs of small-scale fishers and should be undertaken by specialized persons. Special attention should be paid to make the teaching material relevant".

Dr Dilip Kumar focused on "Mobilizing Community in Safety at Sea". Drawing lessons from the FAO/ UNDP/ Government of Bangladesh Project on 'Empowerment of Coastal Communities for Livelihood Security', Dr Kumar said village-level organizations should be community-driven, and should be motivated and facilitated to engage in participatory resource management. Over a period of time, they could become problem-solvers.

### **Group Discussions**

On the second day, the consultation divided itself into three groups to discuss (i) guidelines and other outputs of the Project, (ii) enforcement and implementation of rules and regulations, and (iii) integrating safety at sea into fisheries management.

**Guidelines and other outputs of the Project:** Group 1 noted that traditional boats had evolved over years and were generally safe. But modifications such as motorization added to their risks. While member-countries classified boats on the basis of overall length, the proposed draft guidelines classified them on the basis of sea conditions. The Group recommended that member-countries consider parameters such as area of operation and sea conditions in boat classification. Apart from technical guidelines, member-countries should also consider parameters such as crew accommodation and installation of equipment with regard to stowage, etc, which were part of IMO and ILO guidelines.

Analyzing the training manuals developed under the Project, the Group noted that some training programmes on navigation, boatbuilding and boat maintenance were already being conducted in member-countries. But these targeted the requirements of merchant shipping and did not meet the needs of small-scale fishers. The Group suggested training programme for small-scale fishers that were site-based, with a curriculum and timing suited to them.

The Group urged that a critical mass of trainers be built up in each country, who could then train a large number of fishers. Village Information Centers (VICs) could help out with accident-reporting and information on weather conditions. Pilot-scale projects ought to be implemented to gauge the efficacy of VICs in recording and disseminating information.

### **Enforcement and implementation of rules and regulations for safety at sea:**

On the basis of the experiences of member-countries in enforcing rules and regulations concerning safety at sea, Group 2 suggested several measures.

Fishing vessels and personnel must be insured. Life-saving appliances



on each vessel should be mandatory. Low-cost but good-quality LSA appliances should be developed for use by small-scale fishers. All boats should carry navigational aids such as compass, GPS, etc. Navigation lights were important too, even small boats should have some form of light. Solar-powered lights should be promoted, especially for smaller fishing vessels.

Some other measures: All boats, irrespective of their area of operation, should carry adequate ration, drinking water, fuel, signals, etc. Boatbuilding yards, irrespective of their size and capacity, should be registered. Boat designs must be standardized and based on approved specifications. All boats must have a standard communication system, depending on the area of operation of the boat. For smaller vessels fishing in inshore waters, cell phones are useful. Discussions with the cell phone companies to increase the range as also affordability may be considered. Community-based safety training programmes for fishers should be organized. The BOBP-IGO should discuss the issue of fishers who drift into the waters of a neighbouring country and get jailed. Standard procedures for repatriation of fishers and their boats should be worked out.

Group 2 suggested awareness programmes; pooling of resources by the enforcement agencies concerned; capacity building and increasing staffing to carry out the all-important job of compliance with safety regulations.

**Integration of Safety at Sea into Fisheries Management:** Group 3 said that member-countries ought to strive for sustainable management of marine fisheries resources and secured livelihoods of fishers. But they are hampered by lack of manpower, finance and infrastructure, a poor database and a weak MCS. The Group urged NGOs and the media to raise the profile of safety at sea issues. It suggested the following measures to integrate safety into fisheries management in the region:

They should build awareness on safety at sea and set up community-based organizations. Registration and licensing of fishing boats should be through a single window system and multiple licensing should be avoided. Income generation schemes should compensate fishers for loss of livelihood during closed seasons and areas, while savings schemes should be implemented to build up their assets.

Fishers should take part in planning, implementing, monitoring and

evaluating resource use, and should coordinate with other stakeholders. Boat owners should provide job security for fishers, minimize their stress, and insure boat and crew. The Government should facilitate setting up of market chains; traders should pay fishers fair prices. The Coast Guard should broaden its role and train fishers on various aspects of safety at sea such as communication and use of life-saving appliances. Research organizations in member-countries should determine the maximum sustainable yields in the respective EEZs and provide inputs on harvestable potential.

### Concluding Session

Mr Turner said an enormous amount of work was needed to improve the sea safety regime, and a strong political will was imperative. He called for an International Plan of Action for Sea Safety, which could guide national policies. He said the current phase of the Project would end by December 2008, but he hoped that BOBP-IGO in association with FAO would engage countries in further developing the safety regimes.

The chairperson thanked the BOBP-IGO for a successful Consultation in cooperation with the FAO. He said that the integration of sea safety and fisheries management was a new dimension well-received by the participants.

Welcoming the draft guidelines on safety, he said that after finalization, they should be used by member-countries to prepare standards and revise safety laws for fishers. He hoped that the BOBP-IGO would re-align its work programme accordingly. He also suggested a Regional Plan of Action on safety issues to enable a National Plan of Action in the member-countries.

Dr Yadava thanked the FAO, SIDA, IMO and NIOSH for their support and member-countries for their active participation.



*Participants at the Regional Consultation on Safety at Sea.*



# National Workshop on MCS in Marine Fisheries in India adopts a National Plan of Action

**A** National Workshop on Monitoring, Control and Surveillance in Marine Fisheries, jointly organized by the Government of India and the BOBP-IGO, was held in Chennai on 1-2 December, 2008. Taking part were representatives from the Ministry of Agriculture, the Planning Commission, the Indian Coast Guard and the Mercantile Marine Department; several Departments of Fisheries (Andhra Pradesh, Goa, Karnataka, Tamil Nadu and West Bengal) and Union Territories (Lakshadweep and Puducherry); fisher associations; and the FAO.

Mr Tarun Shridhar, Joint Secretary (Fisheries), Department of Animal Husbandry, Dairying & Fisheries (DAHD&F), Ministry of Agriculture, chaired the opening session.

Welcoming participants, Dr Y S Yadava, Director, BOBP-IGO, recalled that this national workshop and a national plan of action on MCS had been suggested in the *Chittagong Resolution* of the January 2008 Regional Workshop on MCS.

Dr Yadava said that west coast states such as Gujarat, Kerala and Maharashtra were not represented at the workshop, nor Orissa. This indicated that MCS “is yet to be a priority in fisheries management in many coastal States”. In many developed countries, on the other hand, MCS is deeply rooted in fisheries policy. “These countries are now moving from a conventional command-and-control type of MCS to more participatory forms of monitoring and control”. This made MCS more cost-effective



*Mr Tarun Shridhar, Joint Secretary (Fisheries), Government of India.*

said Dr Yadava. Even in some Asian countries, MCS was now an integral part of responsible fisheries. In South-east Asia, some countries were moving towards regional strategies.

Expressing his grief over 9/11, Dr Yadava said that in the past too, fishing vessels had been used for unlawful activities. A strong

MCS regime in maritime states could help strengthen national security. He hoped the two-day Workshop would analyze issues concerning implementation of MCS in India and emerge with an implementable action plan.

In his inaugural address, Mr Shridhar said the focus of MCS in India was on control and



*The National Workshop in progress.*



*Commandant Donny Michael*

surveillance rather than on monitoring. The MCS regime in India was weak because data was poor. A good database, strong institutional backing, the support of stakeholders and a consensus among them to adopt MCS, were essential. MCS should go beyond VMS (vessel monitoring system). It should be perceived as a measure to protect livelihoods, not as a policing activity. Making MCS high on the political and governance agenda was a challenge, Mr Shridhar said. He added that the Ministry of Agriculture has provided budgetary support for fisheries management in the 11<sup>th</sup> Five-Year Plan.

Mr Shridhar said that fish production had gone down in 13 of the world's 15 ocean zones, while the two Indian Ocean zones were still productive. He called for a proactive approach so that these zones remained productive. Some 50 percent of fish stocks worldwide were over-exploited, the reasons behind depletion of fish stocks should be ascertained.

Illegal, Unreported and Unregulated (IUU) fishing is becoming rampant, Mr Shridhar said. Some 25 percent of the global fish catch originates from IUU vessels. IUU fishing can't be brought down overnight. Apart from regulation, better scientific, economic and social understanding of fisheries was essential. The Coast Guard had the major responsibility for surveillance of the EEZ, but it could not focus on fisheries alone.



*Dr C. P. Juyal*

Port State responsibilities too were not being addressed adequately.

Mr Shridhar said that issues in fisheries varied from open access to regulated access to rights-based fisheries. The pressure on capture fisheries could be reduced by lowering post-harvest losses and strengthening aquaculture.

#### **Technical presentations**

In a presentation on “*Monitoring, Control and Surveillance in Small-scale Fisheries – Guiding Principles and Practices*”,

Dr Y S Yadava said that the impact of small-scale fisheries was often overlooked due to its low scale of operation. MCS in India was a challenge because of the predominance of small-scale fisheries and its highly dispersed nature. He called for a time-specific plan of action on MCS and for



*Mr Sebastian Mathew*

strengthening national agencies responsible for MCS as per the ***Chittagong Resolution***.

Dr C P Juyal, Fisheries Research and Investigation Officer, DAHD&F, made a presentation on “*Overall Status of Marine Fisheries in India and its Preparedness for a MCS Regime*”. He described the status of fisheries resources in the Indian EEZ and the potential for deep sea fishing, particularly of tuna and tuna like species. He described existing legal mechanisms and the salient features of the 2004 Comprehensive Marine Fishing Policy of the Central Government. He said that many new initiatives were planned in the 11th Five-Year Plan to strengthen resource management and introduce satellite-based surveillance measures (Vessel Monitoring System or the VMS) for fishing vessels.



*Group Discussion in progress.*





Mr Sebastian Mathew made a presentation on *“Rights-based Marine Fisheries Management and the Role of Fisher Community in Implementation of Monitoring, Control and Surveillance in India”*. He said existing legislation on marine fisheries in India should complement and strengthen international instruments to which India was signatory. He said that if millions of automobiles could be registered annually, registration of fishing vessels should not be regarded as insurmountable.

Mr Mathew said that powers for resource management ought to be legally delegated to the fisher community. He called for a management architecture for sustainable development of fisheries. During discussions that followed the presentation, references were made to the appalling conditions of hygiene and sanitation on fishing vessels; the lack of effort to promote co-management; and the lack of political support for devolution of power to panchayats. Responding to the questions, Mr Mathew said that legal reforms were needed to recognize traditional management arrangements and their adaptation to facilitate an equitable rights-based approach.



In the workshop's final technical presentation, Dr Yadava reviewed the Marine Fisheries Regulation Act as well as the rules, regulations and notifications of coastal States and the Union Territories (UTs), and highlighted gaps relating to MCS. He discussed provisions in international binding and non-binding instruments like the 1982 United Nations Law of the Sea, the 1993 FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement and the 1995 FAO's Code of Conduct for Responsible Fisheries.

During discussions, participants raised several issues – such as weak patrolling; the failure of a central scheme in the late 90s under which patrol boats had been provided to coastal States; the lack of efforts to



*Participants engaged in Group Discussions.*



optimize fishing fleet size; poor enforcement of regulations to prevent fishing in restricted areas. Participants pointed out that some countries had switched effectively from *de facto* open access fishery to regulated access fishery through effective implementation of registration and licensing procedures in consultation with the stakeholders.

Participants suggested that panchayats should be involved in fisheries governance. They said the focus of fisheries development in most states was on fisher welfare programmes; development aspects and MCS were overlooked. On VMS, the workshop felt that caution should be exercised in applying this technology to small fishing vessels.

### **Working Group discussions**

Four Working Groups were formed to discuss the following issues:

**Group 1:** Registration and Licensing of Fishing Boats, Demarcation of Zones, Colour Coding, Communication and Surveillance Infrastructure

**Group 2:** Estimation of Fishing Capacity, Maximum Sustainable Yield and Optimization of Fishing Fleet.

**Group 3:** Governance, Policy and Legislative Support to MCS.

**Group 4:** Institutions, Human Resource Development and Role of Non-Governmental and Community-based Organizations.

Mr M K R Nair, Fisheries Development Commissioner, chaired the proceedings. Presenting the recommendations of Group 1, Mr Ravi Kumar stressed the urgent need for registration and licensing of all seaworthy fishing vessels and for stronger surveillance. He recommended the use of an Automatic Identification System (AIS) for all vessels below 15 meter LOA. On the impoundment of fishing vessels that violate rules and regulations, he said fishing harbours and fish landing centres do not have

## **National Plan of Action on MCS – India**

### **Resource Estimation**

Marine fish landings should be estimated regularly on the basis of a scientifically designed programme, which should be uniform for all coastal States and Union Territories (UTs). Data should be included on biological aspects of commercially important fin and shellfish species. Data should be obtained separately on fish landings from the territorial waters and those from the Exclusive Economic Zone (EEZ). Stock assessment should be carried out at regular intervals.

### **Estimation of Fishing Effort and Adjustment of Fishing Capacity**

Deployment of fishing fleet/ effort by coastal States/ UTs in their territorial waters should be commensurate with the potential yield estimated for such area. It should be made mandatory for fishing vessels to file log sheets containing information on species-wise fish catch, area of operation, effort deployed, etc after each fishing trip to the designated authority. Such mechanisms should be imposed first on harbor-based mechanized fishing vessels, and extended later to other categories of fishing vessels.

### **Registration and Licensing of Fishing Vessels**

All sea-worthy unregistered and unlicensed fishing vessels should be registered/ licensed.

To overcome the shortage of manpower, the Mercantile Marine Department (MMD) may consider delegating registration

powers for fishing vessels less than 20 meters Length Overall (LOA) to the Department of Fisheries (DoF) of coastal States and UTs.

Fishing vessels and crew should be insured. Such insurance should be mandatory for vessel registration and for grant of a licence. Colour coding of fishing vessels should also be mandatory – to indicate the port of registry and the licensed zone of operation.

### **Infrastructure Development**

The existing landing and berthing facilities cater to the requirements of only about 25 percent of the fishing fleet in the country. Result: acute congestion in fishing harbours and landing centres. A thorough assessment must be made of existing infrastructure facilities.

### **Surveillance**

The coastal States/ UTs should provide marine fishers with Identity Cards after proper verification.

A comprehensive surveillance mechanism should be evolved. Such a mechanism should involve the Indian Coast Guard, State Governments and UTs and stakeholders. Fishing vessels operating in territorial waters should use Channel 16 exclusively for distress communication. Separate channels should be used for other communication.

### **Review of Fisheries Legislation**

The Central Government should enact a central legislation to regulate fishing in the EEZ by

Indian vessels, A thorough review should also be done of existing fisheries and supporting legislation, and MCS features should be incorporated. Adequate manpower and funds should be provided for MCS. Where relevant, MCS provisions may be delegated to agencies such as the Marine Enforcement Wing and the Coastal Protection Police.

### **Fisheries Policy and Management Frameworks**

Based on the 2004 Comprehensive Marine Fishing Policy of the Central Government, all coastal States/UTs should formulate policies in concert with stakeholders. The policies should clearly define the objectives and goals of fisheries development. They should ensure decentralization. They may consider promoting rights-based fisheries management to the extent possible. Such policy documents should be dynamic in nature and allow for periodic revision.

Management plans for major fish stocks should be formulated by the Central Government in coordination with States/UTs. Where sufficient data are lacking, such plans may rely on the 'precautionary approach'. The plans may consider fixed time schedules for allowing the stocks to be harvested, *ex situ* and *in situ* conservation and management measures and stock enhancement using proven technologies such as artificial reefs, fish aggregating devices and sea ranching.

The MCS, which is an integral part of fisheries management, should be implemented in stages. The first stage should include mandatory registration and licensing. The second stage should take up enforcement of the provisions contained in the rules and regulations. Involvement of stakeholders from the very beginning would help promoting voluntary compliance by fishers and other concerned user groups.

To coordinate various activities related to fisheries management (e.g. management plans, MCS, safety at sea, exercise of coastal State jurisdiction, port State and flag State control), the setting up of dedicated Fisheries Resource Management and Enforcement Units (FRMEU) may be considered.

### **Capacity Building and Empowerment**

The DoF in each state ought to be adequately staffed with trained technical manpower to address issues of sustainable fisheries development. Capacity-building of fisheries staff should be undertaken in a planned and systematic way. Fisheries institutions and other agencies concerned with fisheries management should also be strengthened. .

The fishing community should be empowered to participate in fisheries management programmes. Its skills and capacities should be enhanced through short-term highly focused vocational trainings and hands-on workshops. The socio-

economic well being of fisher community should be improved. Living conditions of fishers on board fishing vessels should be improved.

### **Community Mobilisation, Communication and Awareness**

Fisher communities should be mobilized to assist in implementing fisheries management programmes. Fisher cooperatives should be strengthened and co-management should be promoted. 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.

The print and electronic media should be made use of to the fullest extent to educate fishers about fisheries management and to build stakeholder capacity.

Success stories (and stories of failure) in fisheries management should be documented and shared with fishers and other stakeholders. Vocational education for fishers and non-formal education of fisher's children should be promoted. These will prepare the community for resource ownership.

### **Coordination and Networking**

The Central Government should constitute an interdisciplinary committee to help implement the MCS action plan and monitor progress through performance indicators.

space to keep such boats. The group called for revamping of the two 24-month training courses conducted by CIFNET, Kochi, which were oriented to merchant shipping; they ought to be more relevant to fisheries.

Some of the points made during discussions: While estimating fishing capacity, both the length of the fishing vessel and gross tonnage (fish hold capacity) should be considered. Working conditions in fishing vessels (as provided for in the ILO Convention on 'Work in Fisheries Sector') should be taken into account while issuing licences to fishing vessels. Resale of fishing vessels should be done with the knowledge of the DoF. The antecedents of boat owners should be verified by the police prior to registration. Life-saving appliances in fishing vessels should be mandatory. The area of operation should be mentioned in licenses issued to boat owners. The various Marine Fishing Regulation Acts/ Rules should be streamlined and harmonized with the Merchant Shipping Act to the extent possible.

Presenting the recommendations of Group 2, Dr H Mohamed Kasim urged the need for regular stock assessment, for estimation of

maximum sustainable yield, for infrastructure enumeration, etc. Some points made during discussions: (i) Should log sheets be used to estimate fish landings? (ii) An 'allowable catch' should be fixed for selected fish stocks. The 'precautionary approach' should be adopted for management (iii) Commercially important stocks should be considered in place of species. (iv) Opening and closing seasons should be declared for fisheries to ensure sustainable fishing.

The chairperson urged coastal states and UTs to urgently assess fleet capacity and prepare an inventory of boatbuilding yards.

Presenting the conclusions of Group 3, Commandant Donny Michael described MCS as a misnomer in India. Coast Guard officers, who have the prime responsibility for MCS in the EEZ, do not undergo any MCS course after an initial capsule programme at CIFNET. During discussions that followed the presentation, it was suggested that fishing vessels be marked with radio identification frequency and that the DoF in each state should exercise greater control on small-scale fishing in territorial waters. The Ministry of Agriculture is

contemplating the use of VMS on all categories of fishing vessels, also proposing a new Bill to regulate fishing by Indian vessels in the EEZ.

Making the presentation of Group 4, Commandant Paramesh said that existing fisheries and other institutions contributed in one way or the other toward implementation of MCS. During discussions, it emerged that the workshops conducted periodically by the zonal bases of the Fishery Survey of India discuss MCS. Empowering the DoF was essential to successfully implement MCS, the workshop was told.

### **Draft National Plan of Action**

A draft National Plan of Action for Implementation of MCS was prepared by the BOBP-IGO secretariat on the basis of the Working Group recommendations and participant feedback, and presented at the workshop's concluding session (see box on pages 18-19). The chairperson, in his concluding remarks, asked coastal States and to include the plan in their own work plans, and involve Panchayati Raj institutions in planning and implementation.



*Participants at the National Workshop on MCS.*



# Useful bi-national workshop on safety of small fishing vessels in India and Sri Lanka

**E**ighteen persons – officials from India and Sri Lanka, along with representatives from the FAO, SIDA, the International Maritime Organisation (IMO), and the National Institute of Occupational Safety and Health (NIOSH), Alaska, USA – took part in a Bi-National Workshop on Small Fishing Vessel Safety in Chennai on 09 July 2008. The Workshop was organised jointly by the FAO, SIDA, NIOSH and the BOBP-IGO. Mr M K R Nair, Fisheries Development Commissioner, Government of India, was in the chair.

Dr Y S Yadava, Director, BOBP-IGO, said the workshop would take a closer look at small fishing vessels in India and Sri Lanka, which share some common characteristics and were heavily affected by the December 2004 tsunami.

Mr Jeremy Turner of the FAO said that the Regional Consultation on Safety at Sea had addressed a host of issues related to sea safety, but the present workshop focused on post-tsunami developments in India and Sri Lanka. He said that sea safety had important socio-economic dimensions. Viability of fishing through control of fishing capacity was inseparable from safety.

Capt B Vormawah (IMO) said that the IMO was the UN body responsible for maritime regulations. It worked together with FAO in several areas such as the Working Group on Illegal, Unreported and Unregulated (IUU) fishing including monitoring of fishing vessel movements. The two agencies had met in January 2005



*The Bi-national Workshop in progress.*

and developed a joint plan for future action. A meeting between the Swedish Maritime Administration and the IMO in February 2006 had paved the way for a SIDA-funded project on tsunami reconstruction and rehabilitation in the Bay of Bengal focusing on small fishing vessel safety.

Capt Vormawah said the IMO was surprised to find that no guidelines existed for construction of small fishing vessels in the region. The IMO component of the global project on safety at sea sought to fill that void.

The representative of Department of Fisheries, Tamil Nadu, said that small-scale fishers were conspicuous along the 1 000 km-long coastline of the state. FRP boats seemed to be replacing traditional wooden catamarans. He hoped that the proposed guidelines would be useful in regulating the construction of boats and in setting up boatyards.

Mr Nair said the workshop would focus on boat design and

construction norms and on the design of boatyards. He said India had sufficient expertise in building commercial and cargo boats. Fishing boat development was undertaken after Independence in 1947 starting with 32 ft fishing vessels and later of 48 ft vessels. This was followed by the construction of 70.5m Mexican trawlers with steel and the introduction of Norwegian technology. Small-scale boat construction is a vibrant activity but hindered by the shortage of quality wood. Boatbuilders have experimented with alternative materials – ferrocement, steel and currently, FRP.

Mr Nair said that construction technology has been deficient. Most boats have compromised with safety. Result: short lifespan and accidents as well. While some of these issues are being addressed, the tsunami had triggered action and brought in IMO and FAO assistance. He hoped that the guidelines proposed by the project consultants on the basis of their survey would be useful.

## Technical Presentations

Five presentations were made in the workshop's technical session.

Mr R Ravikumar focused on environment impact assessment in India and Sri Lanka and on safety issues concerning motorization of small fishing crafts in India. Mr Roger Kullberg discussed issues concerning FRP boat construction in India. Mr Oyvind Gulbrandsen made a presentation on technical guidelines for fishing crafts in India and Sri Lanka.

It was pointed out during the technical session that in India, the popular large-size FRP boats (> 14 m) lack quality control. Lamination is poor, particularly in post-tsunami boats, resulting in hull damage due to abrasion. Fishers try to tackle this with a plaster of cement and sand on the bottom of the boat – a practice that undermines boat safety.

A major safety concern with trawlers arises from their faulty design: a good catch threatens stability! Another important issue is the poor engine installation and fitting: boatbuilders use cheap fittings that are not properly galvanized.

For FRP canoes, the long-tail engine is quite popular because of its easy maneuverability. But since the engine and the propeller have to be started while the fishers are pushing the boat in the water, the longtail threatens safety. Fishers have often been wounded and even killed. In Sri Lanka on the other hand, safety concerns arise from management of the boat. Many single-day boats have been converted to multi-day boats though their design is ill-suited for the latter. The stability of such boats can be compromised if the cabin top is overloaded. Many boats use plastic pipes in the engine room – a fire hazard.

The consultants found that in Tamil Nadu, some 35 percent of the 4 000 or 5 000 FRP kattumarans supplied by various NGOs after the tsunami

faced major problems like hull leak, hull abrasion and cracks. Some 10 percent had been reduced to scrap; even the good boats would not last more than five years from their date of commissioning. This means that two or three years from now, a whole batch of boats will pose serious safety and environmental threats to marine fisheries.

It was pointed out that fishers carry out most repair work themselves, because a repair shop is far away. As for motorization of small fishing craft in India, the pros and cons of existing long tail motors were highlighted. A matrix on safety issues was discussed.

Mr Gulbrandsen said that the proposed technical guidelines were a simplified and adapted version of the Canadian standards for safety of small vessels. He classified the vessels thus: Category A – Ocean; Category B – Offshore; Category C – Inshore; Category D – scattered waters. This functional classification, based on the area of operation of vessels and wave length, is meant to replace the traditional classification based on the length of the boat.

Mr Gulbrandsen said that the new categories would reflect the scantlings and the strength of the hull. He pointed out that in India many open FRP boats lack floatation. However, while wood is unsinkable, the open FRP boat is sinkable.

For FRP boats, floatation is even more important than lift jackets, said Mr Gulbrandsen. He said that sails were becoming obsolete. Sails should be promoted instead of motorization – since sails not only save fuel but provide a lifeline for the crew when engines fail.

## Discussions

Discussions focused on three basic safety issues: disposal or replacement of inferior boats delivered after the tsunami; standardization of designs, material and construction/ maintenance of

crafts including public finance; and enforcement of rules and regulations.

Also discussed was the disposal of old and usable FRP boats. Participants agreed that it's not practical to return them to the NGOs who supplied them. It was suggested that the Government of India discuss with the Government of Tamil Nadu plans to dispose of scrap. Participants expressed concern about the livelihood of fishers once the FRP boats are rendered useless. There's no easy solution, however.

Participants from Sri Lanka said that boat designs are based on what the client wants: it's usually greater fish-holding capacity and higher speed. Builders try to provide these and at a price buyers will find attractive. They end up compromising safety.

Mr Babu Rao said that in the initial stage of development, FRP boats in India were constructed in Government boatyards with effective supervision. But control is absent now, and all types of boats are being constructed. In Sri Lanka, there's a draft legislation in Parliament to address quality problems.

Participants agreed that practical regulations should be devised, based on consultations with boatbuilders and stakeholders. This may be a lengthy process, but it will lead to sensible guidelines for safe boats that meet the needs of industry as well. It was also suggested that boatbuilders should be given guidelines rather than rigid parameters – since requirements vary across the coast both in India and Sri Lanka.

Representatives from India remarked on the deterioration of design and material used in FRP boats during the last 20 years. Old boats are still in use, but recent boats are failing. Participants from Sri Lanka said that the increasing costs of fuel and materials should be borne in mind while devising

regulations. Tax should be waived on materials used for small vessels.

The chairman said that in India the BIS (Bureau of Indian Standards) certification could be used as the standard for materials.

Mr Gulbrandsen remarked that boat thickness should be specified, it has an important bearing on safety.

Mr Ravikumar said there are two aspects to boat design: functionality and structural integrity. While the former could be left to the client, structural integrity should be standardized through a set of guidelines for boatyards.

The workshop noted that at one time, Lloyd's classification was adhered to as the standard for 10-meter FRP trawlers. But newly established boatyards don't follow this practice at all. Lloyd's classification should perhaps be re-introduced as the minimum standard.

The workshop agreed on the following points:

- Unlike wooden boats, FRP boats cannot be constructed on the open beach. Since FRP is not an environment-friendly material, boatyards must exercise the right precautions. FRP standards are non-negotiable and must be enforced. Every boat must have a certification mark for standards.
- Boatbuilding practices in India must be improved. A good shed, trained labourers, storage facilities and a proper infrastructure are needed. Sri Lanka has just 20 boatyards now, as compared to the 70 boatyards after the tsunami, all of them certified according to standards like infrastructure, facilities and electricity. Result: improved quality of construction of boats.
- Hulls must have enough layers of fiberglass.
- Standardization should be done step-by-step, beginning with basics like thickness and



coating. Once the basic standardization is achieved they can be updated periodically.

Concerning regulation and construction of boats, setting up of boatyards, training of boatbuilders, enforcement of regulations and certification, and availability of public finance for boatyards, the workshop observed:

- There's no point in developing guidelines if politicians are not on board. Surveyors and boatbuilders should be trained together to establish rapport with one another, also to ensure that they have the same understanding of the material.
- The National Engineering Training Institute for fisheries and boatbuilders in Sri Lanka has launched programmes at national and regional levels. This institution is also capable of training inspectors.
- Surveyors should have an in-depth understanding of how boats should be built and what the regulations mean in practice. They should correct builders before construction of a boat, not after.
- In Sri Lanka, the authorities are discussing boat design with architects, who are guided by boat design manuals.
- Bank loans are available for boats; implementation of standards may make it easier to get those loans.

On the enforcement of regulations in Sri Lanka and the adoption of draft guidelines for legislation in India, the workshop agreed that:

- In Sri Lanka, draft regulations are being considered by Parliament, but there is no plan yet as regards enforcement.
- International standards on safety at sea must be legislated in India, so that requirements on boat design, boatbuilding, and safety at sea equipment can be enforced. The Ministry of Shipping can enforce safety at sea; state governments can supervise other aspects in coordination with various ministries.
- The quickest way to effect changes is to enforce laws already on the books. Registering boatyards does not need new legislation. But stakeholders must be consulted on the draft guidelines, which must be modified as needed.
- Consultation must be preceded by an awareness drive with stakeholders on the what, why and how of regulation. Such a drive will facilitate compliance.

### Concluding session

Mr Jeremy Turner said the workshop had methodically analyzed problems on a wide range of issues. Member-countries had to strive to bring in legislation and implement it to improve sea safety. "Political will and a brave heart" were called for. Capt B Vormawah of IMO complimented the workshop on a hard day's work that had ended well. She urged India and Sri Lanka to accept the draft guidelines suggested by consultants for construction of FRP boats.

Chairperson M K R Nair said the workshop had been thorough in discussing problems and identifying action, all in a single day. It had come up with a roadmap for implementation.

Dr Yadava said the workshop was effective in shaping the project's future activities. He thanked FAO, SIDA, IMO and NIOSH for their support.



# Asia-Pacific Fishery Commission endorses past work, discusses future plans at meeting in Manado, Indonesia



The Asia-Pacific Fishery Commission (APFIC), held its 30<sup>th</sup> session in Manado, North Sulawesi, Indonesia, on 11-13 August 2008. Thirty three persons – representatives from 15 member-countries, plus observers from SEAFDEC, the BOBP-IGO, the Swedish Board of Fisheries and the FAO – took part. The meeting followed the second session of the APFIC Consultative Forum (see pages 26-28) at the same venue.

The meeting reviewed the activities of APFIC since the 29<sup>th</sup> session, deliberated on a draft overview on the status and potential of fisheries and aquaculture in the region, considered the recommendations of the second APFIC Regional Consultative Forum Meeting (RCFM), discussed two expert workshops organized by APFIC, endorsed major themes for the next biennium (2009-10) and also discussed the organization's strategic plan for 2008-12.

Mr Ndiaga Gueye, Chief, International Institutions and Liaison Service, Fisheries & Aquaculture Department of FAO welcomed participants on behalf of Mr Ichiro Nomura, Assistant Director-General (Fisheries) of the FAO. Mr Freddy Numberi, Minister of Marine Affairs and Fisheries, Republic of Indonesia, referred to his country's close co-operation with FAO and APFIC. He cited the RPOA (Regional Plan of Action) initiated by Indonesia along with Australia to promote responsible fisheries practices including combating illegal, unreported and

unregulated fishing (IUU). He described it as the first regional plan of its kind in the world.

## APFIC activities since the 29<sup>th</sup> session:

The APFIC Secretary summarized the main events and activities undertaken by APFIC since its last session held in Kula Lumpur (21-23 August 2006). These included

- Two regional workshops held in 2007 in Phuket and Ho Chi Minh city.
- Collaboration with regional and international projects such as BOBP-IGO, Mekong River Commision, NACA, SEAFDEC, WorldFish Center and ICSF.
- Assistance to members, such as participation in the RPOA to promote responsible fishing practices and technical inputs for a workshop to consider the risks and benefits of introducing *Penaeus vannamei* into India.
- Information dissemination through an excellent medium,

the APFIC website (<http://www.apfic.org>), and 14 publications.

## Overview: Status and Potential of Fisheries and Aquaculture in Asia and the Pacific

The meeting heard a summary of a draft of this document. Some highlights:

Asia accounted for 87 percent of the 41.4 million persons engaged in fisheries and aquaculture production. Total catch in tropical areas of the Asia-Pacific region was 23.1 million tonnes. In tropical waters, coastal stocks may be more diverse and perhaps more resilient in the face of heavy fishing pressure (in terms of biomass) than in temperate waters. Finfish requiring lower inputs (such as tilapia, carps and barbs) have been important food fish for developing states of the Asia-Pacific region. Many of these species are grown and cultured in backyard ponds – an activity often not captured in official statistics.



Dominant commercial species under culture were brackishwater shrimps, freshwater prawns and freshwater/brackish water crabs. Two major species accounted for over 60 percent of the total crustacean production in 2006 – the whiteleg shrimp *P.vannamei* and the giant tiger shrimp *P.monodon*.

Aquaculture production in the Asia-Pacific region was 46.3 million tonnes – 90 percent of the global figure – sparked mainly by continued growth in China. South Asia's aquaculture production had tripled in 15 years, from 1.4 million tonnes in 1991 to 4.2 million tonnes in 2006, and also diversified.

As for capture fisheries, the phenomenon of fishing down the food chain – of capture of smaller and less valuable species – was noticeable. Shark catches were falling in temperate waters, going up in tropical waters. Tuna catches (the largest constituent of pelagic species) had declined steadily in temperate waters of the Asia-Pacific since 1965.

The Commission recommended that APFIC member-countries provide statistics that include catch effort and vessel numbers; improve estimates of production from backyard systems; provide improved disaggregated reports of the production in aquaculture. The Commission urged a 'constructive dialogue' on Marine Protected Areas between fisheries and environmental agencies to utilize their social and environmental benefits.

### **Regional workshops on capacity management and certification**

The findings and recommendations of two APFIC regional consultative workshops on "Fishing capacity management and IUU fishing" (Phuket, Thailand, 13-15 June, 2007) and "Certification schemes for capture fisheries and aquaculture" (Ho Chi Minh city, Viet Nam, 18-30 September 2007), both funded by Sweden, were discussed.

The first workshop sought greater awareness, understanding and action on making fishing capacity commensurate with the productive capacity of the fishery resource and ensuring its sustainable utilization. The workshop adopted a document on how to address the issues of IUU fishing and capacity reduction. The meeting agreed that the Southeast Asia RPOA is a useful framework for countries and regional organizations.

The second workshop reviewed costs and opportunities associated with certification schemes for fisheries and aquaculture in the APFIC region. The workshop recognized that certification leads to many benefits but several issues must be addressed first – such as regional involvement, inclusion of small-scale fishers and farmers, harmonization of certification schemes, cost-benefit analyses, good governance and stakeholder involvement and capacity-building at national and regional levels. Some recommendations were made.

The Commission was told that many APFIC countries have approved or are drafting national plans of action on IUU fishing. The BOBP-IGO said it had initiated a programme on monitoring, control and surveillance (MCS), and that national action plans for MCS were being developed together with member-countries. The secretariat urged members to send policy information to APFIC for uploading on its website.

Members outlined measures they had taken to manage fishing capacity, China has removed 26 000 vessels from its marine fishery; 80 000 fishers have left the fishery and are being trained for onshore livelihoods. India is capping its motorized artisanal fleet at 50 000 craft and limiting the number of commercial vessels. Malaysia is reducing trawler capacity. The Philippines is refining zonation of coastal areas and shifting excess capacity. Sri Lanka has completed a comprehensive census to establish

a database. Thailand has frozen the number of trawlers and push nets, brought in mesh size controls and undertaken a pilot low-cost vessel positioning system.

On certification, the Commission recommended special attention to workable certification schemes for small-scale farmers and fisherfolk and regional inputs to ensure harmonization of certification schemes. It urged that certification schemes should conform to FAO guidelines on ecolabelling of marine capture fisheries products and the forthcoming FAO guidelines on certification of aquaculture products.

The Commission endorsed the recommendations of the RCFM (see pages 26-28). It also heard accounts of regional arrangements and initiatives such as the RPOA, SEAFDEC-ASEAN, the Coral Triangle Initiative, as well as the 27<sup>th</sup> session of COFI (5-9 March 2007) held in Rome. The secretariat urged members to inform COFI about management initiatives in the Bay of Bengal, the South China Sea, the Yellow Sea and other small ecosystems; implementation of the CCRF (Code of Conduct for Responsible Fisheries); application of the Code to aquaculture; and measures to control IUU fishing.

India informed the meeting that the CCRF is being translated into local Indian languages with the support of the BOBP-IGO, and that this work would form the basis for a national CCRF. The BOBP-IGO pointed out that the CCRF would be 13 years old in October 2008. A review would be timely.

The meeting was told that FAO guidelines for aquaculture certification were being developed. Expert workshops for the purpose had been held in Bangkok (March 2007) and Beijing (May 2008).

APFIC will hold its 31<sup>st</sup> session in South Korea in September 2010, in conjunction with the third RCFM.



# Adapting to emerging challenges in the Asia-Pacific: APFIC Consultative Forum holds useful meet in Manado, Indonesia

Many of the new and emerging challenges to fisheries and aquaculture in the Asia-Pacific were discussed at the Second Regional Consultative Forum Meeting (RCFM) of the Asia-Pacific Fishery Commission (APFIC), held in Manado, North Sulawesi, Indonesia, from 6-9 August, 2008.

Participants exchanged ideas, experiences and insights on challenges in the fisheries sector. Some valuable recommendations emerged, some pathways to progress were highlighted.

The theme title was “Adapting to emerging challenges: promotion of effective arrangements for the management of fisheries and aquaculture in the Asia-Pacific region”.

The once-in-two-years RCFM serves as a forum for analysis, synthesis and agreement on actions needed to reshape fisheries and aquaculture in the Asia-Pacific region. This second RCFM preceded the 30<sup>th</sup> session of APFIC held later at the same venue. (The first APFIC-RCFM which met in Kuala Lumpur in 2006 focused on the theme “Reforming fisheries and aquaculture in the Asia-Pacific region”).

Ninety two persons from 17 countries plus representatives from 15 organizations took part in the second RCFM, which was hosted by the Government of Indonesia, the FAO and APFIC.

Prof. Widi Agoes Pratikto, APFIC chairman and Secretary General, Ministry of Marine Affairs and



Fisheries (MMAF), Indonesia, welcomed participants. Mr Ichiro Namura, Assistant Director-General of Fisheries, FAO, Rome, pointed out (in a message read out in his absence) that APFIC is the world's oldest fisheries commission. The RCFM enables discussion and action on the outcome of important workshops on select issues. Dr S H Sarundajang, Governor of North Sulawesi, said APFIC's role as a policy platform was important in a world of changing climate and changing trade patterns.

**Session 1** reviewed the “**status and challenges in fisheries and aquaculture in the region**”. In his keynote address on “Adapting to emerging challenges”, Prof Hasjim Jalal, International Ocean Law Adviser to the Minister, MMAF, urged more effective synthesis of scientific findings, greater consistency in implementation of agreements, a shift in focus of member-countries from production to sustainable use, improved cost-effectiveness and efficiency, better monitoring and feedback on progress.

Dr Simon Funge-Smith, APFIC Secretary, summarized “Status and potential of fisheries and

aquaculture in Asia and the Pacific”. He said that in 2006, capture fisheries from the APFIC region made up 52 percent of global production. Major trends in capture fisheries: a large increase in inland fisheries in South Asia, improvement in quality of reporting from China, leveling-off of production in Japan and South Korea. Aquaculture production in the region accounted for more than 90 percent of global production, China continued to be the dominant state. In South Asia, inland water culture production had tripled in three years. He said member-countries should improve estimates of production from backyard systems. As regards the future, it looked good – significant progress in fisheries governance, improvement in aquaculture management – but many challenges still needed to be addressed.

The session heard member-countries describe actions and achievements concerning items identified by the 29<sup>th</sup> session of APFIC. These related mainly to mainstreaming co-management into fisheries management, and reducing the catch of low-value/trash fish, especially from marine coastal waters. Many countries reported good progress.

**Session 2** discussed “**Capacity management and IUU fishing in the Asia-Pacific region**”. The Phuket workshop of June 2007 on the subject was recalled. Key steps in capacity management were assessing current capacity, developing national plans of action, and introducing rights-based

measures. Excess fishing capacity should be removed and not transferred to other fisheries. On IUU fishing, steps must be taken to ensure that flagged vessels do not undermine conservation and management effort. APFIC members ought to share data and information to tackle IUU fishing.

Regional initiatives to promote fisheries management – such as those of SEAFDEC, the BOBP-IGO, COBSEA, the WWF's Coral Triangle Programme, and the Arafura-Timor Sea Action Plan – were outlined.

**Session 3** discussed “**certification in fisheries and aquaculture**” and recalled the September 2007 workshop on the subject held in Ho Chi Minh city, Viet Nam. Mr Miao Weimin of the APFIC Secretariat said there's no magic formula to determine whether particular products or fisheries warrant certification initiatives. Cost-benefit generalizations were not advisable. He made suggestions for a cost-benefit analysis using a simple decision tree. Mr Pham Trong Yen from Viet Nam said certification schemes should be - considered not just for South-North trade but also for South-South trade. Mr Sena De Silva of the NACA Secretariat referred to the work being done by FAO and NACA for two years on guidelines for aquaculture certification. The final draft of FAO guidelines on the subject would be presented to the fourth meeting of COFI-AQ on 6-10 October, 2008, in Puerto Varas, Chile.

**Session 4** was devoted to “**Country initiatives in combating IUU fishing and capacity management and promoting certification in fisheries and aquaculture**”.

Australia, Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Republic of Korea, Sri Lanka, Thailand and Viet Nam outlined national efforts and challenges. Some of the questions raised during discussion related to

mitigating the impacts of climate change; the rising costs of fuel; the use of new technologies to manage fisheries; and promotion of South-South cooperation.

The session chairperson said it could not be assumed that joining certification schemes would automatically mean more benefits for producers, but it might improve market access in some areas. He urged that schemes being developed by member-countries should be in accordance with FAO guidelines. The chairperson appreciated the ‘increased openness’ between countries on IUU fishing.

**Session 5** focused on “**Regional Policy Issues and the Code of Conduct for Responsible Fisheries**”. Ms Gabriella Bianchi of the FAO reported on a 2008 workshop held in Bangkok on assessment and management of offshore resources in South and Southeast Asia. She said that these countries had policies to promote and expand fishing farther offshore from their coasts. There was concern that the policy could backfire if not managed effectively. The workshop believed that the offshore resources were rather limited, and in the case of oceanic tuna, already heavily exploited. Several technological, social and ecological constraints made offshore fishing a high-risk undertaking. The workshop recommended a precautionary approach to offshore fishing in

South and Southeast Asia, starting with in-depth economic feasibility studies and risk assessments.

Discussing “Marine protected areas (MPAs) and fisheries management – the human dimension,”

Ms Ramya Rajagopalan of the International Collective in Support of Fish Workers (ICSF), Chennai, said MPAs ranged from ‘no-take’ to ‘multiple-use’ zones. She said ICSF had examined six case-studies (from India, Thailand, Africa and Latin America) to look at ways in which livelihood concerns were incorporated into MPAs. The case studies showed loss of livelihoods, ineffective processes, dominance of natural science and neglect of social science, ineffective implementation of legislation, and poor flow-back of economic and social benefits to communities. The speaker urged a human rights approach to MPAs. Replying to a question, she said MPAs were often designed by environmental ministries for environmental reasons without considering social objectives.

Discussing “Global drivers and their implications for Southeast Asian fisheries,” Mr Steven Hall, Director-General of the WorldFish Center, said the most obvious drivers were trade and markets. Global climate and environment were other major drivers. Many studies had been carried out about the impact on resources, but few about the impact on communities. A vulnerability map showed Africa



*The APFIC Consultative Forum Meeting in progress.*



and sub-saharan Africa to be the most vulnerable to climate change, while large impacts were also felt in Asia.

Other presentations during the session were on “Fisheries assessments – a tool for management?”, “Promoting long-term sustainable management of marine fisheries by addressing illegal, unreported and unregulated fishing – issues and challenges for the APFIC region”, “Adapting to challenges – water development and inland fisheries,” “Aquaculture developments in the Asian region and associated issues that need attention.”

**Session 6** highlighted “**New areas of APFIC’s work**”. Dr Derek Staples, FAO-APFIC Consultant, focused on implementation of the Code of Conduct for Responsible Fisheries through the Ecosystem Approach. The speaker said that the ecosystem approach – recommended by the World Summit on Sustainable Development held in 2002 — could be defined as “a strategy for the integrated management of land, water and living resources that promoted conservation and sustainable use in an equitable way”. In a fisheries context, the ecosystem approach to fisheries emphasizes the management of all the major components in an ecosystem, including associated species, habitats and vulnerable species, and also the social and economic benefits that can be derived from harvesting fish.

Mr Richard Gregory, FAO-APFIC Consultant, made a presentation on “Reducing vulnerability and improving fisheries livelihoods of coastal communities”. He said many fishing communities were caught in a poverty trap. A declining resource base demanded more fishing and increased costs – which drove them deeper into poverty. Finding alternative livelihoods for these people was not easy, since most of them had limited access to land, capital or assets.



*Bunaken National Marine Park,  
Manado*

He said livelihood alternatives could be within a community or outside it, and either extractive or non-extractive. Aquaculture was an extractive option within the community. But it had negative impacts – it could suppress the local price of fish, and sustainability was questionable. Improving market opportunities would be useful, but this was difficult in remote areas.

Non-extractive options such as tourism might not benefit many fishers. At best, fishers could be hired to man tourist boats. Small shops needed business skills. Handicrafts and village industries were an option; access to capital and credit posed problems.

It is time to face up to some truths, Mr Gregory said. Many coastal fishers didn’t want their children to take up their occupation. Governments had a responsibility to assist fishers to diversify. The next generation would need education and skill training and discover new opportunities and options.

### **Summary and Recommendations**

The Forum felt that significant advances had been made in reforming fisheries, but there was need for more effective management. Aquaculture offered opportunities, but its performance had to improve.

The Forum said progress had been made in reducing low-value/trash fish production, reducing trawl sector capacity, improving value addition and improving fish handling and utilization. But production of low-value/trash fish continued to be significant, and this raised concerns about the growth overfishing.

The Forum emphasized that co-management approaches should be mainstreamed into fisheries management. Feedback from member-countries showed that this was happening. Co-management approaches differed across countries: the common feature was better dialogue on decision-making between fisheries agencies, fishers and fish farmers.

The forum recommended that APFIC should continue to facilitate information sharing between regional organizations on key issues relating to fisheries and aquaculture. APFIC should monitor recent changes in member-countries’ policies – specifically, developments relating to IUU fishing, managing fishing capacity, certification, co-management and low value/trash fish.

The Forum identified a dozen tasks for implementation, including the following:

- review how fisheries and aquaculture can adapt or even benefit from climate change;
- evaluate the benefits (human and environmental) of MPAs and their trade-offs;
- assess the impact of subsidies on fisheries and aquaculture in the region and the effect of their removal;
- identify positive and negative impacts of reducing fishing overcapacity;
- promote harmonization of food standards and certification systems for member-countries;
- develop regional cooperation to manage fishing capacity and combat IUU fishing;
- report on changing markets and trade in the region, in particular the effects of FTAs, economic integration and the WTO;
- review the implications of increasing fuel and feed prices on the sector; and
- plan for water development with minimal negative impact on inland fisheries.

# Developing Guidelines for Safety at Sea: Expert Consultation in Rome Provides Guidance

**S**afety at sea is a critical issue in fisheries. Governments need help in providing guidelines to improve safety.

An expert consultation in Rome held from 10 to 13 November, 2008, did just that – it came up with an outline for the development of guidelines for best practices to improve safety at sea.

The Consultation was funded by NIOSH (National Institute of Occupational Safety and Health) through the BOBP-IGO, and the Government of Norway through the FAO FishCode Programme. Sixteen persons took part in the Consultation.

Welcoming participants, Mr Grimur Valdimarsson, Director of the Fish Products and Industry Division, FAO Rome, said that more than 24 000 fishing-related deaths occurred every year. He said that in merchant vessels, a majority of the hazardous operations were carried out in the safety of a port; but in small fishing vessels, crews worked at sea in all types of weather.

He said that human error rather than faulty design, construction or equipment of vessels, was responsible for about 80 percent of the accidents.

Mr Jeremy Turner, chief of the FAO's Fishing Technology Service, ascribed fatalities in fisheries to poor-quality vessels and equipment as well as to human failure. Regulation could address the former issue, a broader range of interventions was needed to eliminate the latter. Economic pressures made owners and skippers resort to cost-cutting on vessel maintenance, safety equipment, labour and working conditions. These contributed greatly to human error and accidents. Holistic solutions were needed that addressed social, economic and technical dimensions.

The resource person from the IMO, Mr Hiroyuki Yamada, said that the long-standing cooperation between FAO, ILO and IMO had yielded a range of instruments related to the safety of fishers and fishing vessels. Collaboration focused currently on

safety recommendations for decked fishing vessels less than 12 m long, and undecked fishing vessels, as well as on guidelines to assist the implementation of the FAO/ILO/IMO Code of Safety.

Dr Jennifer Lincoln (an injury epidemiologist with NIOSH) summarized a paper based on a FAO/NIOSH study on the relationship between fisheries management and safety at sea. Sixteen case studies from around the world were part of the study. The Consultation stressed the need for a shared understanding between fisheries managers and safety professionals, and urged them to work together.

The Consultation recognized the special needs of developing countries in implementing guidelines for safety at sea. To remove constraints to a safety policy, technical and legal assistance might be needed; also assistance in the areas of data collection and analysis, capacity-building, scientific cooperation, and



*A view of the city of Rome from FAO Headquarters.*



the training of trainers and extension workers. The Consultation noted that special attention might have to be paid to available and affordable safety equipment and servicing facilities.

### **Outline for guidelines on best practices for safety at sea**

The outline for the development of guidelines was based on four interlinked 'pillars'. Under the first pillar, a baseline assessment of safety issues is proposed through data collection and analysis of accidents in fisheries.

The second pillar is devoted to creating an inventory or baseline survey that provides a comprehensive overview of all aspects of national fisheries.

In the third pillar, information provided under pillars 1 and 2 is to be analysed to identify safety problems and their causes. This analysis would be used to develop solutions and measures for mitigation. The fourth pillar would concentrate on implementation and promotion of the strategy. It includes recommendations on how to advocate, manage and influence change and evaluate progress.

Here are important points from the four pillars. For complete details, please see FAO Fisheries and Aquaculture Report No 888 (Report of the Expert Consultation on best practices for safety at sea in the fisheries sector)

#### **Pillar 1 – Data collection and analysis to improve safety**

Guidance will be provided on:

- The need for accident/incident data collection, interpretation and analysis,
- Design of data collection systems (Data sources may include records held by the Coast Guard, the Navy, insurance companies, traditional power structures, police, death registers and coroners' inquests, as well as anecdotal evidence from crew members, communities and families),



*Participants at the Expert Consultation.*

- Preparation of a standard form for accident data collection,
- Systems for centralized collection of data from decentralized sources,
- Collection of accident and injury data in remote areas,
- Collection of accident and injury data from confidential sources, and
- Comparing costs of accident prevention versus search and rescue operations.

#### **Pillar 2 – National fisheries sector inventory**

- Comprehensive reports reviewing all national fisheries,
- Numbers of people involved in fisheries, numbers and types of fishing vessels as well as non-fishing vessels dedicated to supporting activities in fisheries,
- Socio-economic analysis of fisher communities and fleet segments,
- A summary of national fisheries management objectives and regulations,
- Definition of links between all concerned administrations,
- Identification of vessel owners, and organizations concerned with fish processing and marketing and fisher representatives,
- Training facilities in fisheries, numbers of qualified trainers and extension specialists,
- Availability of qualified examiners in areas of certification of fishing vessel personnel,

- Legal requirements for consultation/cooperation between ministries and administrations,
- Status of existing national legislation directly or indirectly related to fishing vessel safety,
- Identification of procedures and conditions for licensing and registration,
- Identification of construction standards for fishing vessels and certification requirements,
- Identification of manufacturers and suppliers within the country providing safety equipment, machinery and services,
- Lists of insurance brokers, and
- Historic data on fatalities and injuries.

#### **Pillar 3 – Problems, solutions and safety strategy development**

##### **Analytical tools**

A strategy for improved safety and guidance, including the use of analytical tools, should determine direct contributing factors to fatalities, injuries and vessel casualties before, after and during the event, such as:

- Human factors (fatigue, stress, lack of training, risk-taking behaviour, drug abuse, safety culture),
- Fisheries management regimes (overcapacity, excessive competition),
- Regulatory measures (unclear, inappropriate or out-of-date regulations, gaps or contradictions)

among applicable regulations, particularly regarding registration and fishing authorization procedures),

- Vessel and equipment (poor design and construction, inadequate crew facilities and medical supplies, poor maintenance, lack of quality boatbuilders),
- Physical environment (weather, wind, waves, poor visibility, etc), and
- Operational factors, including vessel management, aids to navigation, navigational error.

### Strategy development

For mitigation or solution of identified problems, guidance should be provided on the development of strategies, participatory mechanisms and implementation programmes, including elements such as:

- A mechanism to ensure broad stakeholder consultation and participation (which may include fish processing and marketing companies, safety equipment and engine suppliers, boatyards, scientific research and training institutes,
- Analysis of the value of existing legislation, preparation of amendments to existing legislation or new legislation,

- Implementation of training needs assessment and voluntary and mandatory training for fishers and inspectors as well as fisheries and maritime administration personnel,
- Analysis of direct and indirect relationship between fisheries management measures and safety at sea,
- Evaluation of factors arising from increased investment, effort and risk,
- The significance of fiscal policies and their effect on safety,
- Development of an effective framework for cooperation between fisheries and maritime and other concerned administrations at the national level,
- Importance of awareness-raising campaigns on safety among fisher communities, and empowerment of fishers in the decision-making process through the participatory approach, and
- Early warning systems, disaster preparedness, risk reduction planning and implementation and other mitigation arrangements.

### Pillar 4 – Managing Change

Drawing upon the data collection and analysis, inventories and problems, and the solutions identified, Pillar 4 will seek to

promote an overall strategy on how to manage or influence change. Plans of action with measurable goals and objectives to monitor progress and evaluate impact will be developed. Guidance will be provided on the need -

- To raise political will and commitment for improving safety,
- To identify pressure groups to bring about change,
- To empower all stakeholders to take identified action, and where applicable, the formation of a safety committee (fisheries and maritime administrations, training institutions, fishing boat owners and operators, fisher unions, cooperatives, families, insurance entities),
- To consider the value of formal classroom and informal training,
- For consultation among all stakeholders, the objective being that people in fisheries take on the onus for best practices to improve health and safety,
- To provide the resources to bring about change, including skills, expertise, time and financing to ensure change through action, performance and accountability,
- For quality project design and formulation, including progress indicators, and addressing implementation, ongoing monitoring and evaluation, and correction and adjustment,
- For the development of a communication strategy, for distribution of all pertinent information and awareness-raising, and
- To use mentors to enhance communication with fishers.

The Consultation has asked the FAO Secretariat to proceed with the development of guidelines on the basis of the outlines summarized above. Experts present at the Consultation will be involved in the effort. Expertise in the ILO and IMO secretariats will be tapped.



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Jim Sandkvist



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Participants of the Expert Consultation.



# Thinadhoo Island, Maldives

Text and Photographs by  
Y S Yadava

Maldives is an archipelago of 1 190 low-lying coral islands grouped into 26 atolls. The country has an area less than 300 sq. km and a total coastline of 644 kilometers. Some 200 islands are inhabited. The population of the Maldives (July 2000) was estimated at about 320 000. Only five islands have a population more than 3 000.

Thinadhoo (Gaafu Dhaalu atoll) is one of the most highly populated islands in the southern part of the Maldives, and an economic hub of the area, with an airport close by. Its area: 58.10 ha; Population: 6 376.

A BOBP-IGO-NIOSH mission – Dr George A Conway, Director, Alaska Centre of the National Institute for Occupational Safety and Health, USA, Ms Elizabeth Conway, Research Assistant and Dr Y S Yadava – visited Thinadhoo July 17-19, 2008. Objective: To assess safety-at sea requirements of fishers in the southern islands of the Maldives as well as the accident reporting system in fisheries. Mr Ahmed Rashid, Fisheries Research Officer, accompanied the mission.

Island chief Nasir Ahmed gave the mission a brief tour. They saw the newly-constructed ice plant and the fish market (both being post-tsunami initiatives) and the boatbuilding industry. Boats being built ranged in length from 100 to 120 feet. The mission also visited the Thinadhoo hospital.

At a stakeholder meeting organized in the evening, a large group of local fishers took part and told the mission about their needs and problems. Thinadhoo has some 400 active fishers. The main species caught? “Tuna, tuna and tuna”, said a fisherman. All the fishers engage in pole and line tuna fishing, mainly in the atolls. “Fish stocks seem to

be going down every year,” one fisher grumbled. “We have to travel long distances for bait fishing. Our cost of operations is going up.”

The fishers do not regard fishing as a hazardous occupation. In fact, no major fishing-related accident has been reported in more than two decades (except the March 2004 incident, when a boat carrying 126 passengers capsized, killing 21). One reason could be that the fishers operate only within the atolls and in clear weather – they do not fish when conditions turn rough.

Injuries are sometimes caused by hooks. One fisher even lost an eye. Many fishers have now started wearing helmets to protect faces and eyes. They dive deep to catch tuna bait. (Scuba tanks have replaced the once-popular ‘hookahs’ or surface lines). Sometimes they are victims of decompression sickness. Eye problems are common due to prolonged exposure to bright sunlight.

As for safety equipment, the fishers carry satellite phones, GPS and SSB radios, besides life jackets and life belts. They are adroit swimmers and skilled navigators and claim a bit of mechanical aptitude as well – they can attend to minor repairs themselves.

The fishers complained about indiscriminate boatbuilding in the Island – neither any quality control nor inspection. New boats constructed are stretched models of older versions, with no modification in structural design. Recently, a 120 ft fishing boat broke into two – it had been stretched too far. The fishers are not insured, but they plan to go in for insurance.

The photographs on this and the facing page provide glimpses into Thinadhoo Island, and into the lifestyle and work style of the fishers.







*Map of Gaafu  
Dhaalu Atoll  
(Thinadhoo Island)*



1



2

*1- Boat construction in progress; 2- The mission with local fishers; 3- The newly constructed fish market; 4- Pole & line fishing vessels lined up at the jetty; 5- Aerial view of Thinadhoo Island.*



# Impacts of Climate Change on Coastal and Marine Fisheries Resources in Bangladesh\*



**B**angladesh has an area of 147 570 sq. km and a population of 156 million. It is bordered by India and Myanmar, with the Bay of Bengal and the North Indian Ocean to the south and the Himalayas to the north.

Climatically, Bangladesh is one of the world's most vulnerable countries (Table 1). Frequent natural disasters such as cyclones cause loss of life and damage to infrastructure, economic assets, and livelihoods. Much of the country is routinely inundated during the summer monsoon. High population density and poverty aggravate the vulnerability. The population of Bangladesh may swell to over 200 million by 2050 (WB and BCAS 1998).

\* M. G. Hussain, Director General, Bangladesh Fisheries Research Institute (BFRI), Mymensingh. M. Enamul Hoq, Project Director, Support to Sustainable Development of BOBLME Project, BFRI, Mymensingh.

Climate change is a long-term phenomenon. Scenarios for 2030 and 2050 for Bangladesh have been developed under the United States Country Study Program, also by the World Bank (Table 2).

According to IPCC (2001), the following changes related to the Bay of Bengal have been observed in Bangladesh in the form of climate trends, variability and extreme events:

- Average temperature has registered an increasing trend of about 1°C in May and 0.5°C in November during the 14 -year period from 1985 to 1998.
- The annual mean rainfall has been increasing and decadal rain anomalies have exceeded the long-term average since 1960s.
- Serious and recurring floods have taken place during 2002, 2003 and 2004. Cyclones originating from the Bay of

Bengal have been noted to decrease since 1970 but the intensity has increased.

- Frequency of monsoon depressions and cyclone formation in the Bay of Bengal has increased.
- Salt water from the Bay of Bengal is reported to have penetrated 100 km or more inland along tributary channels during the dry season.

## The coastal and marine environment of Bangladesh

The Bay of Bengal, the marine area of Bangladesh, is characterized by a semi-enclosed tropical basin. The coastline of the country comprises about 710 km extending from the tip of Teknaf in the south-east to the south-west coast of Satkhira (Fig.1). As a result, an area more than 166 000 km<sup>2</sup> along a 710 km coastline comes under the economic jurisdiction of Bangladesh for

exploration, exploitation, conservation and management of its marine resources.

### Climate vulnerability

#### *El Niño and La Nina*

Some studies report that the *El Niño* Southern Oscillation events influenced the record-breaking floods of 1987, 1988 and 1998 (Chowdhury, 1998).

The rapid transformation of *La Nina* from the *El Niño* phase of early 1998 is said to have influenced high rates of precipitation over the entire GBM catchment basin. As a result, a prolonged dry season was followed by the wettest monsoon – eventually leading to the deluge of the century. Global events can therefore have ominous local weather effects.

#### **Flooding**

Analysis of past floods suggests that, about 26 percent of Bangladesh is subject to annual flooding. An additional 42 percent is at risk of flood with varied intensity (Ahmed and Mirza, 2000). A 10 percent increase in monsoon precipitation in Bangladesh could increase runoff depth by 18 to 22 percent, resulting in a seven fold increase in the probability of an extremely wet year (Qureshi and Hobbie, 1994).

#### **Cyclones and storm surges**

A tropical cyclone hits Bangladesh, on an average, every three years. These storms generally form in the months just before and after the monsoon and intensify as they move north over the warm waters of the Bay of Bengal. Storm surges are higher in Bangladesh than in neighboring countries because the Bay of Bengal narrows towards the north, where Bangladesh is located. In recent years, general cyclonic activity in the Bay of Bengal has become more frequent, making the seas rougher and making life difficult for fishermen and making small craft difficult to use.

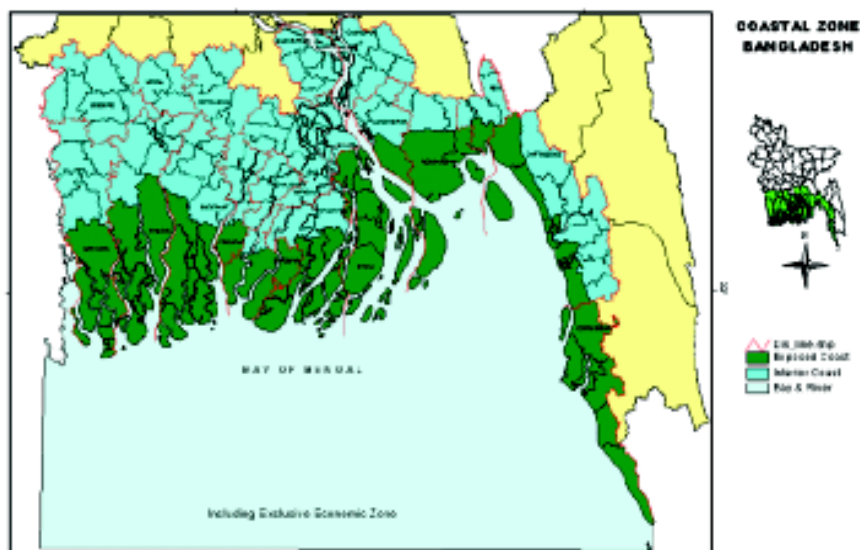


Figure 1. Coastal zone of Bangladesh

Table 1. Major climate-vulnerable countries (Deaths/100 000 people exposed to floods or cyclones)

Floods			Tropical cyclones		
1	Venezuela	4.9	1	Bangladesh	32.1
2	Afghanistan	4.3	2	India	20.2
3	Pakistan	2.2	3	Philippines	8.3
4	China	1.4	4	Honduras	7.3
5	India	1.2	5	Vietnam	5.5
6	Bangladesh	1.1	6	China	2.8

Source: UNDP (2004)

Table 2. Climate change scenarios for Bangladesh in 2030 and 2050

Year	SLR (cm)	Temperature increase (°C)	Precipitation fluctuation compared to 1990 (%)	Changes in evaporation
2030	30	+0.7 in monsoon +1.3 in winter	-3 in winter +11 in monsoon	+0.9 in winter +15.8 in monsoon
2050	50	+1.1 in monsoon +1.8 in winter	-37 in winter +28 in monsoon	0 in winter 16.7 in monsoon

Source: UNFCCC (2002)





### Sea level rise in Bangladesh

Another critical variable that determines the vulnerability of Bangladesh to climate change impact is the magnitude of sea level rise.

### Impact on fisheries and aquaculture

Sea level rise and consequent changes to the river estuary can trigger changes in fish habitat and breeding ground. Penaeid prawns breed and develop in brackish water, where salt water and fresh water mixes. Sea level rise would turn this interface backward, changing the natural habitat of the prawn population. There are some 60 shrimp hatcheries and 120 shrimp processing plants in the coastal zone of Bangladesh. The hatcheries are located along the sea beach at Cox's Bazar. Favourable environmental condition and brood stock availability are the main reasons to set up hatcheries in that area. Some hatcheries have also

Table 4. Marine fish production (MT) in Bangladesh

Year	Industrial	Artisanal	Total
1997-1998	15 273 (5.60)	257 545 (94.40)	272 818
1998-1999	15 818 (5.11)	293 979 (94.89)	309 797
1999-2000	16 304 (4.88)	317 495 (95.12)	333 799
2000-2001	23 901 (6.30)	344 596 (93.70)	379 497
2001-2002	25 165 (6.06)	390 255 (93.94)	415 420
2002-2003	27 954 (6.47)	403 954 (93.53)	431 908
2003-2004	32 606 (7.16)	422 601 (92.84)	455 207
2004-2005	34 114 (7.18)	440 483 (92.81)	474 597
2005-2006	34 084 (7.10)	445 726 (92.90)	479 810
2006-2007	35 391 (7.26)	452 047 (92.74)	487 438
Average	26 061 (6.30)	376 868 (93.70)	404 029

\* The figures in parenthesis indicate percent of total

started trial and experimental production in Chittagong and Satkhira coast. These districts are located in coastal zones vulnerable to sea level rise – making the shrimp hatcheries and shrimp fields vulnerable as well.

Sea level rise helps shrimp farming in one way – by introducing salinity in the coastal area. But flooding caused by sea level rise can

inundate shrimp ponds and destroy this prospective foreign exchange earner. It can also affect the dry fish industry.

### Climate change and the Sundarbans ecosystem

On the basis of different vulnerability indicators for accelerated sea level rise, the Woods Hole Oceanographic





Institute (WHOI), 1986 produced a list of 27 low-lying countries. The list was headed by Bangladesh. The Bay of Bengal acts as a funnel for storm events, creating severe storm surges. These can raise sea level above tidal height and devastate a low-lying coast like that of Bangladesh.

The Sundarbans can be wiped out by a 1-metre rise in sea level (World Bank, 2000). Loss of the Sundarbans would be catastrophic – a loss of heritage, of biodiversity, of fisheries resources, of life and livelihoods and of a very high productive ecosystem.

Sea level rise can decrease availability of light for corals and thereby their growth. It can destroy St. Martin's island, the only highly productive coral island of Bangladesh.

#### ***Climate change impacts on marine fisheries resources***

Alteration of marine ecosystems due to climate change has both direct and indirect effects on fish – their reproduction, migration and survival.

Hilsa (*Tenualosa ilisha*) is the national fish of Bangladesh. It accounts for 13-14 percent (valued at around Tk 6 000 million, 1.3 % of GDP) of the total fish production of Bangladesh. During the last two decades hilsa production from inland waters declined about 20 percent, whereas marine water

yield increased threefold. Major hilsa catch has gradually shifted from inland to marine waters.

Recent studies reveal that the availability of hilsa is gradually declining in the Padma and Meghna river catchment areas. Result: hilsa production in the rivers has been going down, while that in marine waters has been going up. Similar conditions might occur for other marine fish/shrimp species, but no study has yet been carried out in Bangladesh.

#### **Combating climate changes**

In 2005, the Government of Bangladesh launched its National Adaptation Programme of Action (NAPA), in partnership with other stakeholders. It identified adaptation needs to combat the effects of climate change. The Climate Change Cell in the Department of Environment supports the mainstreaming of climate change into national development planning.

#### ***Adaptation measures in fisheries as prioritized in Bangladesh NAPA***

- Promoting adaptation to coastal fisheries through culture of salt tolerant fish, especially in coastal areas of Bangladesh.
- Adaptation to fisheries in areas prone to enhanced flooding in North East and Central Region through adaptive and diversified fish culture practices.

- Reduction of climate change hazards through coastal forestation with community focus.

#### ***Adaptation options for climate changes***

Adaptation seeks to reduce the adverse effects of sea level rise on living organisms, including human and the environment. The ability to adapt and cope is a function of wealth/income, technology, scientific and technical knowledge and skills, information, infrastructure, policy and management institutions and equity.

Sea level rise adaptation can be addressed by changes in policies that lessen pressure on resources, improve management of environmental risks, and enhance adaptive capacity. As most of the populations of the coastal communities of Bangladesh are fishermen and farmers, the adaptation options should focus on these two sectors. If we can implement various adaptation options for coastal fisheries, as shown in the following Causal Loop Diagram (CLD) (see Fig. 2 on page 38), we find that five loops may reinforce to increase the fisheries production. Foreign exchange earned by coastal fisheries could be re-invested to develop the sector.

Coastal communities should be prepared to combat climate change through disaster preparedness activities. A disaster calendar should be prepared for the communities, so that they can safely practise fish farming. Example: most cyclones in the coastal zone occur in October and May. Coastal district Noakhali as well as Khulna, Satkhira and Patuakhali districts should be covered by the proposed calendar. Fishermen should avoid these districts for fishing and fish farming during specified periods.

Weather forecasts on Bangladesh radio and television are usually delivered in an academic or literary style, not suitable for coastal farmers and fishermen. Target



groups should be able to understand and react to forecasts. Local radio stations should broadcast special programmes on issues relating to sea level rise.

Research should be conducted to identify salinity-tolerant species in coastal fisheries. Species selection should be made for low, moderate and high saline environment. After selecting different species for different zones or saline environments, fishermen should be trained in breeding and seed production techniques including cultivation and harvesting of the species.

### Future climate change strategy and action plan

The Government of Bangladesh is committed to strengthen the country's resilience to climate change, reduce risks posed to national development; and development of the country along a low-carbon growth path. The Bangladesh Climate Change Strategy and Action Plan (BCCSAP) is a 10-year programme (2009-2018) to build the capacity and resilience of the country to meet the challenge of climate change (see box on page 39). It has been developed through a participatory process involving various ministries and agencies, research organizations and the business community.

### Role of Bangladesh Fisheries Research Institute

The Bangladesh Fisheries Research Institute (BFRI) is at the primary stage of a climate change study. BFRI has a long-term study programme on hilsa fishery in Bangladesh. Recently, a programme was initiated on the impact of climate change on the maturity and spawning of hilsa in relation to habitat degradation. Another technical support programme is going on – to identify and analyze sound fisheries and aquaculture risk adaptation options in drought-prone areas of North West and coastal areas of South West Bangladesh.

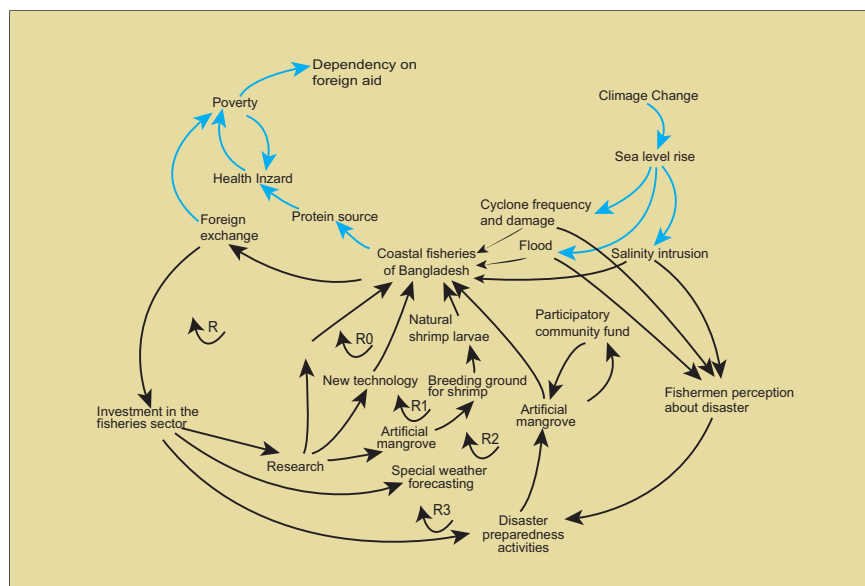


Figure 2. Causal Loop Diagram for adaptation options of coastal fisheries with sea level rise (Sarwar, 2005).

BFRI should in future heighten its focus on climate change impact on fisheries; it should in particular strengthen research as well as survey and monitoring capacity in marine fisheries – which is presently weak because of absence of infrastructure (vessel) and technical manpower. The Department of Fisheries is trying to obtain a research vessel for BFRI through the OIC-supported Marine Capacity Building Project.

### Conclusions

Climate change impact in Bangladesh is high, though the country's greenhouse gas emissions are low. The government needs to pay keen attention to issues related to climate change impact, organize research, develop salinity-tolerant

species in both agriculture and fisheries, and develop a strategy to combat impact. Adaptation costs should be recovered from coastal resources using economic instruments.

Research is also needed to preserve the country's biodiversity. Technical and financial assistance from the international community is essential.

The main climate change impacts on the marine environment are rise in sea water temperature, salinity and sea level, drop in sea surface pH, and changes in upwelling and water mass movement, and the behaviour of *El Niño* and *La Nina*,

Climate change would affect the distribution and abundance of marine fish species. Many fish species have a narrow range of optimum temperatures related both to their basic metabolism and the availability of food organisms. Depending on the species, the area it occupies may expand, shrink or be relocated. No specific research has yet been conducted in these issues in Bangladesh and countries. A coordinated long-term research project on the impact of climate change on marine resources in the Asia-Pacific region is an urgent need.





### BCCSAP of Bangladesh concerning fisheries and biodiversity

Programme and time-frame	Justification	Specific actions
The development of adaptation strategies in the fisheries sector (mid to long-term)	<p>Climate change is likely to adversely affect freshwater and marine fisheries resources in Bangladesh. For example: the spawning of freshwater and marine species may be affected. Water temperatures in fresh, brackish and marine waters may go up. Saline waters may extend further inland in the south of the country. This will alter existing aquatic ecosystems and production of fish. There may be turbulent weather along the coast for longer periods, impacting on the livelihoods of fishermen.</p> <p>These potential impacts must be identified and researched and management strategies developed, tested and made ready, in anticipation of climate-related changes.</p>	<ul style="list-style-type: none"> <li>Assess potential threats to fish spawning and growth of fish in the freshwater fisheries sector and develop adaptive measures, including fish farming and river-based cage aquaculture, etc.</li> <li>Assess potential threats to fish spawning and growth of fish in the coastal zone and brackish water and develop appropriate adaptive measures and mariculture practices.</li> <li>Assess potential impacts on the shrimp sector and develop appropriate adaptive measures and cultural practices.</li> <li>Assess potential threats to the marine fish sector and develop adaptive measures to protect these resources</li> </ul>
Monitoring of ecosystem and biodiversity changes and their impacts (mid to long-term)	<p>One of the objectives of the UNFCCC is to urgently reduce green house gas emissions, so that ecosystems and their flora and fauna have time to adjust to climate change. Salinity levels are also likely to increase significantly in the coastal belt.</p> <p>Mangrove ecosystems, which are already under serious stress for anthropogenic reasons will suffer heavily due to further increases in salinity. These could alter the entire ecosystem of the Sundarbans and cause the extinction of some valuable fish/shrimp and other aquatic species.</p> <p>In view of these expected changes, a systematic monitoring mechanism should be put in place to assess the impact of climate change on ecosystems and bio-diversity. A participatory impact monitoring mechanism involving communities and experts will be designed. Pertinent physical, chemical and biological data will be collected. Changes that take place in livelihood patterns due to ecological and biodiversity changes will be assessed and policy recommendations and appropriate actions suggested.</p>	<ul style="list-style-type: none"> <li>Set up a well-designed monitoring system to evaluate changes in ecosystem and biodiversity, covering all important and sensitive ecosystems.</li> <li>Develop participatory monitoring systems by involving trained people such as school teachers, communities and academic researchers.</li> <li>Report changes in ecosystems and biodiversity and assess the implications, including those for the livelihoods of local people, and recommend adaptation measures.</li> </ul>

Source: MOEF (2008)

### Further reading:

Ahmed, A U and M M Q Mirza, 2000. Review of Causes and Dimensions of Floods with Particular Reference to Flood '98: 'National Perspectives'. In: Q K Ahmad, A K A Chowdhury, S H Imam & M Sarker (eds.) Perspectives on Flood, 1998. The University Press Limited, Dhaka. 142p.

Chowdhury, A, 1998. Disasters: Issues and Responses, In: Gain, P (ed.), Bangladesh Environment: Facing 21st Century, SEHD, Dhaka, Bangladesh.

IPCC, 2001. Climate Change 2001: Impacts, Adaptation and Vulnerability, Cambridge University Press, UK.

Qureshi, A and D Hobbie (eds.), 1994. Climate Change in Asia: Thematic Overview. Asian Development Bank, Manila. 351p.

Sarwar, M G Mahabub, 2005. Impacts of sea level rise on the coastal zone of Bangladesh. Thesis, Lund University. International Masters Programme in Environmental Science. Lund University, Sweden. 45p.

UNDP, 2004. A Global Report: Reducing Disaster Risk: A Challenge for Development. <http://www.undp.org/bcpr>.

WHOI (Woods Hole Oceanographic Institute), 1986. <http://www.whoi.com>.

World Bank, 2000. Bangladesh. Climate Change & Sustainable Development. Report No. 21104 BD, Dhaka.

World Bank and BCAS, 1998. Bangladesh 2020: A Long-run Perspective Study. The World Bank & Bangladesh Centre for Advanced Studies (BCAS). The University Press Limited, Dhaka, Bangladesh.



## Andreas Westerberg, a profile

**A**ndreas Westerberg, 33, joined the BOBP-IGO in Chennai as Fishery Officer in FAO's Global Project on Safety at Sea for Small-Scale Fisheries in Developing Countries (South Asia) in late 2008. The assignment is till June 2009.

Andreas hails from Linköping, Östergötland, Sweden, where he served as a Project Coordinator for the Swedish Maritime Administration (SMA). An economist, Andreas also holds a post-graduate degree in Maritime Affairs from the World Maritime University, Malmö, and in Business Administration from the University of Gothenburg. He is also an able seaman trained in Crowd Management, Small Pleasure Craft Driving and VHF operation.

Andreas is enjoying his first overseas assignment – exploring local culture, experimenting with local cuisine, and helping out a children's NGO. He is a linguist (proficient in Swedish, English, Spanish, French and Portuguese) and a competent photographer. He talked with Bay of Bengal News about his life and career.

***Q: What were your duties at the Swedish Maritime Administration?***

A: I worked with a project to offer a Search and Rescue (SAR) Mission Coordination Course for Estonia. I also assisted the SAR unit at the SMA and the Marine Rescue Coordination Centre. I was responsible for collecting SAR-related information, project planning, monitoring and implementation.

***Q: Please elaborate on your safety-at-sea related experiences.***

A: A major goal of the SMA is to provide sustainable transportation nationwide. Safe shipping for trading

and fishing vessels is an integral component of sustainability. All our projects, including those I planned and implemented, aimed at enhancing safety at sea. Earlier, I helped prepare a report on "Survey of strategic Swedish ports" for the government. This work provided exposure to maritime governance in Sweden and inter-agency responsibility sharing, which I hope will prove useful in this project.

As financial officer in another project, concerned with masterplan studies for the development of fairways in the Baltic Sea, I enabled conflict resolution between fishing vessels and larger merchant vessels for safe fairways.

As regards technical experience, I have served as a pilot dispatcher in the Vessel Traffic Service (VTS) center in Göteborg – a heavily congested area often used as a working area by fishing vessels. I carried out coordination/logistic activities relating to piloting in the Port of Göteborg.

While with the T/S Gunilla soon after my business administration studies, I was busy with fire drills, 'man overboard' drills and other safety drills.

***Q: You have been an editor and teacher as well.***

A: I worked for some time with *Smålandsposten*, a daily newspaper, as local editor. I took photographs, wrote several articles and handled day-to-day editorial work. This experience proved handy for producing an annual report on the development of the Swedish maritime sector for the SMA in 2006. I have also published several articles in journals of the World Maritime University and the University of Gothenburg.



# Fishing Ports of Japan

Text: Y S Yadava & Masaaki Sato

Photographs: Y S Yadava



Gleaming, spotless, picture-postcard-perfect: Japan's fishing harbours are icons of excellence in technology, management and upkeep.

“Big investment alone doesn't ensure quality, it has to be married to discipline and commitment,” remarked a visitor.

While governments play a major role in planning and constructing the harbours, day-to-day upkeep is often the responsibility of fisheries co-operative associations, and they do an impeccable job. Fishers and fisher associations in the Bay of Bengal region – take note!

Here's a word-and-picture tour of Japan's fishing ports illustrative, not comprehensive.

Japan has 2 917 fishing ports, distributed over five islands and 42 Prefectures (or provinces). A fishing port must be approved by the Minister in the Ministry of Agriculture, Forestry and Fisheries (MAFF) of the government of Japan before it can be commissioned. Local opinion is considered before approvals are given. The cost of commissioning a fishing port is shared by the Fisheries Agency and the Prefectural government concerned. Japan's fishing ports are managed either by Prefectural governments or by municipal governments and they are of four types, as described below:

**Type 1 fishing ports** (about 76 % of the total) are used mainly by local fishers.

**Type II fishing ports** (about 17 % of the total) cover a larger administrative area as compared to Type I fishing ports.

**Type III fishing ports** (about 4.0 % of the total) are used by fishing vessels of all the Prefectures of Japan. Of these, there are 13 key ports, labeled as 'Special Type III

Fishing Ports (STTFP)', located in major fishing areas of Japan.

**Type IV fishing ports** (about 3.0 % of the total) are located in remote islands and/ or geographically disadvantaged areas. These ports help develop fishing grounds and shelter fishing vessels when the seas are rough.

Table 1 provides Island-wise distribution of different categories of fishing ports in Japan.

**Special Type III Fishing Ports:** The 13 STTFPs in Japan are strategically distributed among 11 Prefectures (Aomori, Miyagi, Chiba, Kanagawa, Shizuoka, Tottori, Shimane, Yamaguchi, Fukuoka, Nagasaki and Kagoshima). Miyagi Prefecture alone has three STTFPs (Shiogama; Kesen-numa and Ishinomaki).

Kesen-numa port in Miyagi Prefecture is a famous hub for tuna

**Table 1: Fishing ports in Japan**

Island/ Prefecture	Type I	Type II	Type III	Type IV	Total
I. Hokkaido Island	215	30	18	21	284
II. Honshu Island	978	289	66	36	1369
III. Shikoku Island	344	48	8	4	404
IV. Kyushu Island	594	125	21	32	772
V. Okinawa Island	76	4	1	7	88
<b>Total</b>	<b>2207</b>	<b>496</b>	<b>114</b>	<b>100</b>	<b>2917</b>

*Note: The number of STTFP ports are included in Type III Fishing Ports.*



longliners and shark fin vessels. Yaizu fishing port in Shizuoka Prefecture is Japan's biggest fishing port for tuna landing. Many large tuna longliners (sizes ranging from 300 GT to 500 GT) which operate in the Indian Ocean, the Atlantic Ocean and the Pacific Ocean, unload their catch at this port.

Makurazaki fishing port (Kagoshima Prefecture in Kyushu Island) is famous for landing of skipjack (*Katsunus pelamis*) pole and line fishing vessels. Shimonoseki fishing port (Yamaguchi Prefecture) is famous for landing of globefish, or puffer fish (*Fugu rubripes*) from autumn to winter. The puffer fish is quite expensive, and often fetches 5 000 yen/ kg (about US\$ 55/ kg at current exchange rate). The Hakata fishing port (Fukuoka Prefecture in the northern tip of Kyushu Island, close to Korea and China) is frequented by many Korean and Chinese fishing vessels to unload their catch. Fish transport vessels from these countries also frequently visit this port.

#### Process of commissioning a fishing port

When fishers want a port, they raise the issue at the general meeting of their Fisheries Cooperative Association (FCA). A resolution requesting a port is sent to the local government (municipality and Prefectural Government), which in turn approaches the Fishing Port Building Consultative Committee. At the same time, the local or Prefectural Government inspects the port site and draws up a plan, often employing private consulting companies.

The FCA lobbies with members of the local assembly, the Prefectural assembly and national Parliament members representing that Prefecture to hasten the decision-making process. Lobbying is a part of the strategy – since it's the Minister who has to approve of the port and the national government that has to fund it. A tug-of-war between different governments and agencies over budget allocation is common. The final power for site selection rests with the Minister of MAFF. The Central government usually meets half of the expense for a fishing port, and the Prefectural government the other half. Sometimes, the local government (city or town) pitches in with 25 percent.

*1-Fishing port of Aji FCA located at Aji-cho, Takamatsu city, Kagawa Prefecture; 2-Fishing port at Notsuke, Hokkaido; 3-Slipway facilities at a Fishing port operated by Nago FCA, Okinawa; 4- Fishing port operated by Shin Fukaura FCA in Aomori Prefecture; 5 A fishing village with fishing port facilities in Aomori Prefecture; 6- Oodose Wholesale Fish Market, Aomori Prefecture.*

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**Table 2: Criteria for classification of fishing ports**

Type of fishing port	Criterion for classification of the port
<b>Type I</b>	More than 25 fishing vessels; < 250 GT in total gross tonnage. (For ports facing the Sea of Japan (SoJ), < 18 fishing vessels and < 175 GT). The catch landed should be < 1 125 metric tons per year (for ports facing the SoJ, it is 788 metric tons). The port has mooring and fish handling facilities and roads that are wider than 3m.
<b>Type II</b> (At least three criteria are fulfilled)	More than 50 local fishing vessels, with < 500 GT. In Prefectures facing the SoJ (Akita, Yamagata, Niigata, Toyama, Ishikawa, Fukui, Kyoto, Hyogo, Tottori, and Shimane Prefectures), the number is < 35 fishing vessels, with total gross tonnage <350 GT. More than 25 fishing vessels with < 250 GT. For ports facing SoJ, < 18 fishing vessels with <175 GT. The conditions for landing of catch and other facilities are same as required for Type I Ports.
<b>Type III</b> (At least three criteria are fulfilled)	More than 140 local fishing vessels, with gross tonnage < 2 400 GT. For Prefectures facing SoJ, < 98 fishing vessels of < 1 680 GT. More than 70 fishing vessels with < 1 600 GT. In case of Ports facing SoJ < 49 fishing vessels with gross tonnage < 1120 GT. The Annual fish landing at the Port should be < 5 000 metric tons; for Ports facing the SoJ it should be < 3 500 metric tons. The port should have has mooring and road facilities (wider than 5.5 m) or a railway line; facilities for fish handling, vessel repair, water supply, fuel supply, ice-making, freezer and cold storage are also mandatory.
<b>Type IV</b> The port should be situated either in remote island or in geographically disadvantaged area.	The port is especially necessary from the standpoint of fishing The port should be ground development (as a base port for development) and also situated either in as a shelter for fishing vessels. Further, there should be no remote island or in such port within 50 km radius. However, this criterion does geographically not apply for difficult areas (rapid currents, topographical disadvantaged areas, irregularities, threatening oceanic and weather phenomena). The port is expected to provide a reasonable calm water area. It must help strengthen the safety and efficiency of two or more fishing ports nearby and should strengthen development and assist in disaster mitigation.

### Criteria for selecting sites for fishing ports

Article 6 of the Fishing Port and Fishing Ground Development Act (Law No. 137, 1950) lays out the criteria for constructing a fishing port. The site should have an enabling natural and economic environment, and should be used by local fishers as their base port. More than 20 local fishing vessels should patronize the site, and there ought to be a justification for a port (such as a need for shelter). Table 2 specifies the criteria for permitting various type of fishing ports.

### The Fishery Policy Council

Any changes to a fishing port (concerning fresh construction or modernization, for example) must

be approved by the Minister of MAFF, who will consult the Fishery Policy Council (FPC) and ascertain the views of local public entities as well. The FPC (19 members plus advisors) has three committees – a Planning Committee; a Fisheries Resources Committee; and a Fishing Port and Fishing Ground Development Committee.

*Source: Gyokou Gyojou Gyoson (Handbook of Japan's Fishing Port, Fishing Ground and Fishing Communities, 2009).*

*1-4: Fishing boats operating from ports in Japan; 5:Early morning auction in Hakodate Fishing port, Hokkaido.*

2



1







3



4



5

# Safety at Sea in Bangladesh

## Basic equipment and hands-on practices demonstrated to small-scale fishers

Artisanal and small-scale fisheries dominate the marine fisheries of Bangladesh. A severe handicap of artisanal fisheries is the absence of navigational, aid or communication gadgets – and even knowledge or awareness of these gadgets. In fact, fishers set out without even life jackets and life buoys, the most basic of personal protection equipment (PPE). Hence, when calamities strike – be they storms, pirates or boat malfunctions – casualties are high. In the absence of any social security net, formal or informal, a fisher's death means a destitute family. Good news: This situation is about to change.

Under the Global Project on Safety at Sea (South Asia), hands-on training sessions were organised in Cox's Bazaar (17-22 October 2008) to familiarize fishers with handheld GPS (global positioning system) and marine VHF Radio and promote the use of PPE as well as of emergency medicines and safe drinking water.

### Demonstration of improvised PPE

Earlier that day, a large group of skippers and crew assembled in the Fishing Harbour operated by the Bangladesh Fisheries Development Corporation (BFDC) in Cox's Bazaar to witness a demonstration of GPS and PPEs by the Coast Guard officers. They were shown how to wear a life jacket and how to stow it, and how to use a handheld GPS system. The fishers learned how to start a GPS, keep track of the cruising route, change pages and note positions during distress.

For many fishers, the PPE demonstration was an eye-opener.



Such is their belief in their own swimming ability that they don't regard PPE as essential. But they learned from the Coast Guard trainers that PPEs would keep them afloat and alive at sea even if they fell unconscious. So many fishers drowned every year despite being good swimmers – because they fell unconscious. Further, could they swim much when the weather got rough?

**Float rings vs life jackets:** The demonstration included a 'contest' between locally improvised float-rings and a life jacket. The float rings were made by binding together 12-14 floats used to mark nets. They are tied to the waist. The 'contest' took place at the river mouth near the BFDC Harbour. The result was inconclusive. Both float rings and a life jacket can keep you afloat, but a life jacket is easier to wear and more comfortable to use. On the other hand, the float ring is far cheaper, and easier to store and maintain as well.

### The story of Jaladas and Kalidas

This happened in the third week of July in 2007, at the start of the hilsa season. Sanatan Jaladas was on the crew of a 65 HP hilsa fishing vessel.

He and 24 others were on their way to the Sundarbans. Disaster struck: bad weather, strong winds, vessel capsized! Sanatan was lucky, he caught hold of some marker floats, so did a few others. But he could not see Kalidas, his friend and neighbour. He was frantic, but all he could do was keep afloat himself by tightening his grip. Two hours later, Sanatan was rescued by another fishing vessel. But he lost five of his colleagues to the storm – including Kalidas.

### Safety-cum-health awareness workshop

To promote basic safety-and-health practices among the fishers, a workshop was organised at Dakshin Dhurang Jelepura, a fisher settlement in Kutubdia upzilla, Cox's Bazaar, on the morning of 19 October 2008. Ferry services every hour link Dakshin Dhurang Jelepura to the mainland.

This was the first time an expert team was visiting the settlement, so a large group of men and women turned out. COAST, an NGO, facilitated the workshop, which was held in a local primary school.

The team consisted of Dr Y S Yadava (BOBP-IGO), Mr R Ravikumar (FAO), Dr Shariffuddin and Mr Zahirul Haque (Department of Fisheries),

Mr S Jayaraj and Mr Rajdeep Mukherjee (BOBP-IGO). Dr Misbah Uddin Ahmed, Resident Medical Officer, Government Hospital, Cox's Bazaar, accompanied the team.

During the three-hour session, fishers told the team about their problems out at sea. Most of them



## Training in marine VHF radio and GPS

The use of Marine VHF Radio is unheard of in artisanal fisheries in Bangladesh – though international safety conventions declare that the use of VHF is a must (It often serves as the last resort of survival for a fishing vessel in distress). Of the country's 44 000 marine fishing vessels, only some 100 industrial trawlers have this facility.

On the afternoon of October 22, 2008, a group of 15 majhis (skippers) of artisanal fishing vessels were taken onboard the FV Moeen – a shrimp trawler operating in the Bangladesh EEZ. Their trainers: two officers from the Bangladesh Coast Guard. The majhis had 15 years of experience in fishing, but this was the first time they saw a VHF radio. They spent the first half hour of the training session seeing and feeling the device mounted on the cabin wall.

The majhis were all ears when the trainers explained the VHF device. They were told that it is a marine transmitter-cum- receiver. It operates only on standard international frequencies known as channels. Channel 16 is the international distress channel. Example: If fire breaks out in a vessel, the crew can transmit a 'fire' message through the channel and indicate their location.

As per international norms, ships and fishing vessels always keep their VHF active. When they pick up a distress call in their vicinity, they will rush to help. So will patrol boats of the Bangladesh Coast Guard.

Asked how a ship could locate the vessel in distress, the trainers pointed out that VHF radio is used in conjunction with the GPS system. Even a handheld GPS system can help to locate a vessel at sea. Asked

one majhi: did he have to speak in *ingraji* (English) on VHF radio? Not necessary in Bangladesh waters, assured the trainer, But he urged the majhis to get familiar with all-important English words like 'fire', 'engine trouble' and 'medical emergency'. This knowledge would be useful. The majhis had indeed heard these words before.

"Simply great" was the first reaction of Moktar majhi after the demonstration. He remarked "Cell phones don't work when we get to sea. During the day we can shout or use hand signals, at night all that we can do is pray. I never knew that we could communicate distress so easily." He asked about the cost and availability of the equipment.

The majhis felt that they could talk to their boat owners about equipping the vessels with VHF sets and handheld GPS. One majhi quipped *Amago jaan na houk, nuakatara bachaibar loge to mahajan lagaitei pare!* ("The owner should do this to save his boat if not our lives.")



served as crew or as majhis skippers in fishing vessels that operated at Dublachar in the Sundarbans. During the fishing season, they were away from home for 5 to 6 months. During this period, they stayed in the Sundarbans to catch *hilsa*, *suri*, *dhaisa*, *roopchanda*, ribbon fish, shrimp and *loita*. Said the fishers “We have no PPE. The plastic or water containers and floats are the only floatation devices. We do carry radio sets and cell phones, but the phones are out of signal range. We carry some medicines too. Diarrhea is a severe problem. Every year, two or three deaths occur on account of diarrhea.”



Dr Ahmed told the fishers about a simple method of purifying water using sunlight and plastic (PET) bottles. He said that water contamination was what caused diarrhea. (When fishers ran out of water during their prolonged stay in the Sunderbans, they drank from rivers or ponds.) But what the fishers could do was to fill up the PET bottles with water from a clean source, then place the bottles on the roof of the fishing vessel in sunlight. Exposure to sunlight for 4 to 6 hours in a sunny day neutralizes many of the harmful bacteria present in the water and makes it safer, said Dr Ahmed.

He also gave them advice on warding off the HIV infection, avoiding the use of tobacco products, vaccination of mother and child and the use of local food products – leaves and vegetables – to meet their dietary requirements. The fishers discussed their health



problems with the doctor and enquired about treatment in Cox's Bazaar.

The workshop ended with a cultural programme that conveyed the messages of safety at sea and good health. A video documentary was made on the experiences of the fishers at sea and the problems a fisher family confronts when their breadwinner dies.

Another workshop the following day in another fisher settlement – Majhgonā jaladaspara, Chakoria Upzilla, Kutubdia. And another NGO, BASTOB, facilitated this workshop, held in the community hall of the Jaladaspara. The village had a cyclone-warning flag post maintained by the villagers. Dr Shariffuddin explained the objective of the workshop. Mr Zahirul Haque demonstrated the use of improvised marker floats as a floatation device.

The fishers shared their experiences on safety issues with the team. They said that piracy was a major threat; every year, hundreds of dacoities were common in the Cox's Bazaar area. Communication was a major problem, they said. They carried cell phones (which didn't work in



the sea) and transistors (which often broke down). The team advised the fishers about proper maintenance of transistor sets and about the need to frequently check the weather bulletin. The fishers complained that they were made to work even when cyclone signal 3 was announced. Said one fisher: “Catch rate of fish before a storm is high, hence the skipper encourages the crew to linger and keep fishing.”

### Video documentary

Engine malfunction is behind much of the distress that afflicts fishing vessels out at sea. There are some 44 000 fishing vessels in Bangladesh of which a majority use engines for propulsion. Most of these engines are reconditioned – new engines are costly. Fishers believe that the reconditioned engines work well enough. But when they are not properly maintained, these reconditioned engines break down during a voyage and endanger the lives of crew.

The BOBP-IGO enlisted Mr M Srinath, an expert in engines, to help out with an educational video on engine maintenance for the fishers of Bangladesh. The first round of shooting for this video was done during 16-23 October in Cox's Bazaar and Chittagong. It focused on basic facts about the common type of engines in use in Bangladesh, their availability, common engine problems faced during fishing trips, trouble-shooting practices, what engine-repair workshops could do, A leading engine repair workshop, Jalal Mechanical Workshop, provided the facilities.

A bilingual video (Bengali and English) is being prepared. It will be disseminated through the Marine Fisheries Office, Department of Fisheries, as well as through harbour management organisations and NGOs.



### **National Workshop on Monitoring, Control and Surveillance (MCS), 22-23 March 2009, Malé, Maldives**

MCS in Maldivian waters presents a range of unique problems including IUU fishing; licensing; conservation of vulnerable species; and optimum realization of available resources.

This national workshop is to formulate a roadmap to ensure responsible management of fisheries resources in Maldives. The workshop will be held in coordination with the Ministry of Fisheries and Agriculture, Government of Maldives.



### **Fourth Meeting of the Technical Advisory Committee (TAC), 22-23 April 2009, Dhaka, Bangladesh**

This meeting will discuss activities carried out by the BOBP-IGO during the period April 2008-March 2009. The TAC will also help the Secretariat to prepare an activity matrix for the period April 2009-March 2010 for approval by the Governing Council of the BOBP-IGO slated to meet later in 2009.

### **Awareness campaign on Safety at Sea, Cox's Bazaar, Bangladesh**

Awareness campaigns on safety at sea for small-scale fishers will be organized during April 2009 in two sites of Cox's Bazaar, Bangladesh. These pilot sites have been selected under the South Asia component of the FAO Global Project on Safety at Sea. The awareness campaigns will



include stakeholder meetings and demonstration of safety gear, personal hygiene, etc. Village theatre groups will also be used for the awareness campaign.

### **Fourth International Conference on Fishing Industry Safety and Health (IFISH-4)**

The BOBP-IGO is cooperating with the FAO, NIOSH, the Institute for Sustainable Development, the University of Iceland and The Icelandic Maritime Administration, Iceland, in organizing the Fourth International Fishing Industry Safety and Health Conference (IFISH-4) in Reykjavik, Iceland from 11 to 14 May 2009. With funds made available by the FAO, the BOBP-IGO is sponsoring 14 participants from developing countries. The Conference aims at building an international coalition, and at promoting action to prevent injury and improve health in the commercial fishing industry. For details see the IFISH-4 website (<http://www.ifishconference.org/index.htm>).



### **Regional Consultation on Sea Safety, June 2009, Chennai, India**

Fishing always entails risks, and there is now a consensus on the need for obligatory safety training. The FAO is implementing the SIDA funded global project on 'Safety at Sea for Small-scale Fisheries in Developing Countries' from 2007.



The Project advocates a holistic approach to fisheries management with safety at sea as an integral part of the management framework. This Regional Consultation will review the accomplishments under the Project in South Asia; discuss the Safety Guidelines for Fishing Vessels under 24 meters in length; and plan future activities on safety-at-sea initiatives.

### **Fifth Meeting of the Governing Council of the BOBP-IGO, June 2009, Chennai, India**

The Governing Council is the highest decision making body in the BOBP-IGO.

The most senior representatives of member-governments Bangladesh, India, Maldives and Sri Lanka will take part. The Governing Council will review the activities implemented during the period April 2008-March 2009 and will finalize the plan for April 2009-March 2010.



### **Second Regional Training Course on the Code of Conduct for Responsible Fisheries, June 2009, Chennai/Mumbai, India**

This course will be held in association with the Central Institute of Fisheries Education, Mumbai. Sixteen delegates from Bangladesh, India, Maldives and Sri Lanka will take part. The course is meant to educate junior and middle-level fisheries officials on the principles and practices of CCRF through lectures, community interaction, group discussion and personal assignments.



# Awareness Materials

The BOBP-IGO has brought out a variety of awareness promotion materials on safety at sea (illustrations on this and the facing page.)

## Precautionary messages

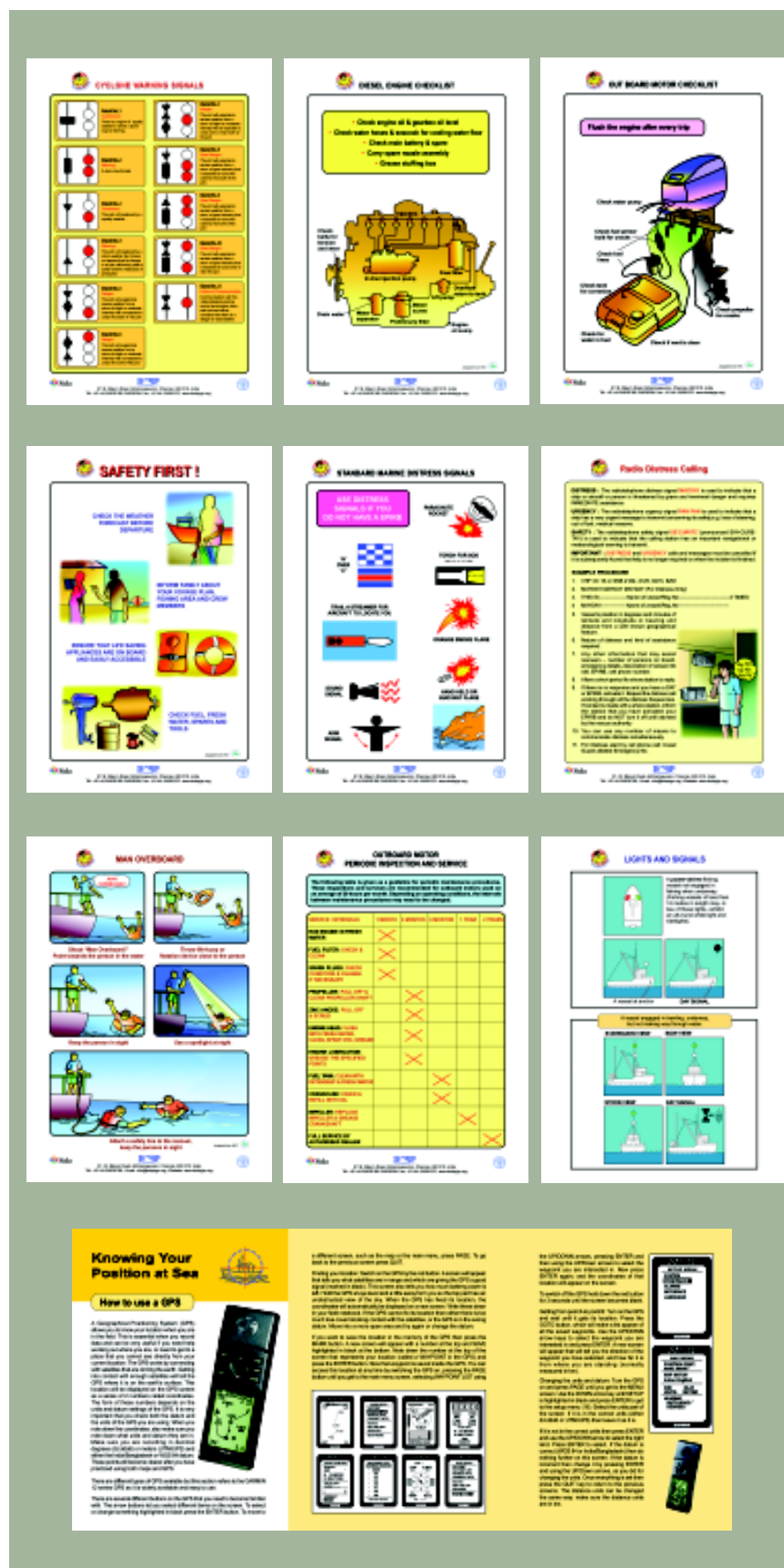
Ten colour handout sheets (in English, Tamil, Telugu and Bangla) on preventing, mitigating or confronting disaster at sea have been prepared and distributed to fishers in India and Bangladesh.

“Safety first” tells fishers about what they should do and what precautions they should take before starting on their fishing trip. Like telling their family members where they will be fishing and who will be going out with them.

“Standard marine distress signals” instruct fishers on how they should tell the world that they are in trouble. They can send up a “parachute rocket” – a cloth balloon that can light up at the tail and create a red flare noticeable from afar. They can create an orange smoke flare. They can create an on-off flare with a hand-held device, or a yellow-coloured flare in the water through another device. They can keep putting a torch on and off.

They can create a red streamer in the water, for aircraft to spot. They can send out sound signals through intermittent blasts of a horn. An arm signal – both arms outstretched – can convey a ‘Help’ message to rescuers who are near.

“Cyclone warning signals”: There are 11 cyclone warning messages varying in kind and degree – about the likelihood of squally weather, a storm forming, a moderate storm, a severe storm, failure of communications with the meteorological centre, etc. Harbour authorities flash these messages on flagposts raised high to help fishers



Laminated placards for awareness on Safety at Sea.



setting out to sea, or fishers who are close to the harbour.

“Lights and signals”. A power-driven fishing vessel uses these to inform others about its activity – not engaged in fishing, engaged in trawling, etc.

“Man overboard”: What steps should a person on a boat take when someone falls overboard? These simple sketches provide guidance.

“Radio distress calling”: What code words should you use to convey distress quickly and effectively to a radio station? ‘Mayday’ conveys danger. Utter the word ‘Mayday’ a few times. ‘Pan pan’ means you need urgent help. The radio user should follow up by conveying his vessel’s position, the kind of assistance needed, etc.

### Engine maintenance

Three handout sheets have been prepared for engine mechanics. They are “diesel engine checklist,” “outboard motor checklist” and “Outboard motor: periodic inspection and service”.

### Poster calendar

A poster calendar or a single-sheet wall calendar repeats the themes and months of BOBP-IGO’s 2008 calendar on safety at sea. It has been given to officials and fisher associations. Its 12 illustrated messages are: Safety begins at home. Plan your fishing trip – it always pays. First-aid kit – never forget to carry. Make the deck a safer place for work. Navigation equipment and spares – keys to safety. Signals will help to locate you at sea. Use protective gear while handling equipment and harmful aquatic organisms. Conserve fresh water. When in distress, you are safe in a lifebuoy. Fishing in pleasant waters – use condoms. Fishing boats should be built as per specifications and safety requirements. “Together we shall make fishing safer”. (Fishers, boatbuilders, boat owners, the authorities).



### Safety at sea T-shirts

Three thousand simple but elegant cotton T-shirts emblazoned with a safety-at-sea logo (see above) have been manufactured. They are being distributed to officials and fishers of Bangladesh, India, Maldives and Sri Lanka.



**Safety at Sea**

## 2008

**JANUARY**

SUN	4	11	18	25
MON	5	12	19	26
TUE	6	13	20	27
WED	7	14	21	28
THU	8	15	22	29
FRI	9	16	23	30
SAT	10	17	24	31

**FEBRUARY**

SUN	3	10	17	24
MON	4	11	18	25
TUE	5	12	19	26
WED	6	13	20	27
THU	7	14	21	28
FRI	8	15	22	29
SAT	9	16	23	24

**MARCH**

SUN	31	3	10	17	24
MON	1	8	15	22	29
TUE	2	9	16	23	30
WED	3	10	17	24	31
THU	4	11	18	25	
FRI	5	12	19	26	
SAT	6	13	20	27	

**APRIL**

SUN	7	14	21	28
MON	8	15	22	29
TUE	9	16	23	30
WED	10	17	24	31
THU	11	18	25	
FRI	12	19	26	
SAT	13	20	27	

**MAY**

SUN	4	11	18	25
MON	5	12	19	26
TUE	6	13	20	27
WED	7	14	21	28
THU	8	15	22	29
FRI	9	16	23	30
SAT	10	17	24	31

**JUNE**

SUN	1	8	15	22	29
MON	2	9	16	23	30
TUE	3	10	17	24	31
WED	4	11	18	25	
THU	5	12	19	26	
FRI	6	13	20	27	
SAT	7	14	21	28	

**JULY**

SUN	6	13	20	27
MON	7	14	21	28
TUE	8	15	22	29
WED	9	16	23	30
THU	10	17	24	31
FRI	11	18	25	
SAT	12	19	26	

**AUGUST**

SUN	31	7	14	17	24
MON	1	8	15	18	25
TUE	2	9	16	19	26
WED	3	10	17	20	27
THU	4	11	18	21	28
FRI	5	12	19	22	29
SAT	6	13	20	23	30

**SEPTEMBER**

SUN	7	14	21	28
MON	8	15	22	29
TUE	9	16	23	30
WED	10	17	24	31
THU	11	18	25	
FRI	12	19	26	
SAT	13	20	27	

**OCTOBER**

SUN	5	12	19	26
MON	6	13	20	27
TUE	7	14	21	28
WED	8	15	22	29
THU	9	16	23	30
FRI	10	17	24	31
SAT	11	18	25	

**NOVEMBER**

SUN	24	1	8	15	22
MON	25	2	9	16	23
TUE	26	3	10	17	24
WED	27	4	11	18	25
THU	28	5	12	19	26
FRI	29	6	13	20	27
SAT	30	7	14	21	28

**DECEMBER**

SUN	7	14	21	28
MON	8	15	22	29
TUE	9	16	23	30
WED	10	17	24	31
THU	11	18	25	
FRI	12	19	26	
SAT	13	20	27	

BOBP: Bay of Bengal Programme, Inter-Governmental Organisation  
 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100  
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