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Report of the

FAO/SWIOFC REGIONAL WORKSHOP ON SAFETY AT SEA FOR SMALL-SCALE FISHERIES IN THE SOUTH WEST INDIAN OCEAN

Moroni, Union of the Comoros, 12–14 December 2006

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PREPARATION OF THIS DOCUMENT

This document details the methodology, the results of the debates and the conclusions and recommendations of the working groups at the FAO/SWIOFC Regional Workshop on Safety at Sea for Small-scale Fisheries in the South West Indian Ocean. It also contains the presentations of the experts from seven of the member States of the South West Indian Ocean Fisheries Commission (SWIOFC) that participated in the workshop.

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ABSTRACT

The Regional Workshop on Safety at Sea in Artisanal and Small-scale Fisheries in the South West Indian Ocean was held in Moroni, Union of the Comoros, from 12 to 14 December 2006. Forty-one experts from the South West Indian Ocean (SWIO) region including an expert from Sweden and representatives of FAO participated. The workshop was organized and implemented by the Fishing Technology Service of the FAO Fisheries and Aquaculture Department, in close collaboration with the FAO Subregional Office for Southern Africa. During the workshop, the results of the Study on safety at sea in artisanal and small-scale fisheries in the South West Indian Ocean, conducted in May 2006, were presented. In addition, seven experts from SWIOFC member States made presentations and took up matters affecting safety at sea in their countries. Experts from Grenada, Sweden and FAO made presentations on global and regional aspects of safety at sea that enriched the information provided to the delegates. The information presented was debated in four working groups on different themes covering fishing operations, data collection, legal framework and technology.

CONTENTS

LIST OF ACRONYMS

CSP	Centre de surveillance des pêches, Madagascar
DMI	Dar es Salaam Maritime Institute, United Republic of Tanzania
EPIRB	Emergency position indicating radio beacon
FAO	Food and Agriculture Organization of the United Nations
FIIT	Fishing Technology Service of FAO
FITEC	Fisheries Training and Extension Centre, Mauritius
FRP	Fibreglass reinforced plastic
GPS	Global Positioning System
KMFRI	Kenya Marine and Fisheries Research Institute
LOA	Length overall
NGO	Non-governmental organization
SFA	Seychelles Fishing Authority
SIDA	Swedish International Development Cooperation Agency
SMA	Seychelles Maritime Authority
SUMATRA	Marine Transport Regulatory Authority, United Republic of Tanzania
SWIO	South West Indian Ocean
SWIOFC	South West Indian Ocean Fisheries Commission
THA	Tanzania Harbours Authority
TMA	Tanzania Meteorological Agency
VMS	Vessel monitoring system
ZAC	Zone d'aménagement concerté, Madagascar

Chapter 1
Introduction

BACKGROUND

In May 2006, FAO undertook a study of fisheries-related sea safety of small-scale fishing vessels in the South West Indian Ocean. The objective of the study was to assist in the development of regional strategies to improve small-scale fishers' safety and to guide the Fishing Technology Service of FAO (FIIT) in its examination of global initiatives. The study also aimed to help raise awareness of the extent of the problem among policy-makers and administrations of the region, and to identify constraints that have reduced the effectiveness of efforts to improve safety. This workshop was held in order to examine the results of the study, discuss the issue of sea safety, and make recommendations to advance the issue regionally in the context of the South West Indian Ocean Fisheries Commission (SWIOFC).

OPENING OF THE WORKSHOP

The FAO/SWIOFC Regional Workshop on Safety at Sea for Small-scale Fisheries in the South West Indian Ocean was held in Moroni, the Union of the Comoros, from 12 to 14 December 2006. Mr Ben Allaoui Aboubacar, Director of Fisheries for the Comoros, welcomed participants to the workshop. Mr Jeremy Turner, Chief, Fishing Technology Service (FIIT), addressed the meeting on behalf of the Director-General of FAO and the Assistant Director-General of the Fisheries and Aquaculture Department, Mr Ichiro Nomura. He highlighted the fact that fishing is considered the world's most dangerous occupation with an estimated 24 000 deaths annually. Safety at sea involves interrelated components, but social and economic issues as well as overfishing of coastal resources are major factors that have constrained efforts to improve safety at sea. In the last 50 years, global fish landings have increased from 20 million to 86 million tonnes. This has led to increased fishing pressure on marine resources. He noted that, generally, fisheries administrators have been more concerned with the long-term conservation and sustainable use of fisheries resources than with the welfare of those who harvest them. Finally, he drew attention to the importance of political will, motivation and commitment in order to achieve progress in the implementation of safety at sea measures (Annex 1).

Mr Aubrey Harris, FAO Senior Fisheries Officer for Southern and East Africa made a statement on behalf of the FAO Representative for the Comoros, who was unable to attend the meeting. He noted that the workshop provided an excellent opportunity for promoting the sharing of information and practical actions to address safety at sea issues in the SWIOFC member countries. The Comoros had been chosen as the venue for the workshop in view of the importance of this issue to the country (Annex 1).

The Permanent Secretary for the Ministry of Agriculture, Fisheries, Industry, Craft and Environment of the Union of the Comoros officially opened the workshop on behalf of the Minister, who could not be present. He stressed that a major priority of the workshop was to prepare a draft proposal for a regional project on strengthening safety at sea in the region. This project should address the legitimate desire of member governments to obtain specific solutions and put in place longer-term regional actions. He looked to the workshop to identify constraints on efforts for improving the safety of artisanal fishers and to promote regional strategies aimed at ensuring their safety in their respective countries and in the region (Annex 1).

AGENDA

As it was a technical workshop on safety at sea, Mr Jeremy Turner chaired the proceedings. Chapters 2–5 summarize the proceedings of the workshop. Annexes 2 and 3 provide the workshop agenda and the list of participants.

CLOSING STATEMENTS

At the end of the workshop, the chairperson made a brief final statement, thanking the participants for their contributions to the meeting and indicating that the discussions had been lively and well focused.

He concluded by urging the Secretary of the SWIOFC to review and consider the report and look for ways and means of implementing the recommendations. He proposed that the SWIOFC Scientific Committee should discuss the recommendations and make proposals at the next SWIOFC meeting in December 2007, where the best way to proceed with its implementation would be decided.

CLOSING OF THE WORKSHOP

The Permanent Secretary for the Ministry of Agriculture, Fisheries, Industry, Craft and Environment of the Union of the Comoros thanked the organizers of the workshop and the participating countries and officially closed the workshop on 14 December 2006.

Chapter 2
Study on safety at sea

As a background for the workshop, Mr Joël Nageon de Lestang, consultant, presented the results of a study on safety at sea in four countries of the region, i.e. Comoros, Kenya, Madagascar and Seychelles (Annex 4). This study addressed six important issues relevant to sea safety:

- the relationship between fisheries management and sea safety;
- safety programmes;
- data recording;
- fisheries legislation;
- boat-building and vessel design;
- other safety issues, such as communications systems, navigation equipment, search and rescue, safety equipment, and the availability of spare parts.

He concluded that, in most of the four countries, safety at sea issues were not considered a priority and that most fisheries legislation was more concerned about the conservation of fisheries resources than the safety of the fishers themselves. Small fishing vessels accounted for a greater percentage of national landings but received the least attention in terms of safety regulations, construction standards, enforcement and monitoring strategies, and training programmes for their crews to improve safety. He noted that engine spares, life-saving equipment and communications equipment (radios, emergency position indicating radio beacons [EPIRBs], etc.) were often unavailable on the local market or sold at excessive prices. Finally, the report concluded that most fishers as well as the general public showed a lack of awareness of security at sea programmes and that, therefore, education backed by a good supply of engine spares, and life-saving and communications equipment at affordable prices would offer the best chance for improving safety at sea for small-scale fishers.

The recommendations for improving safety at sea for small-scale fishing vessels in the South West Indian Ocean (SWIO) include:

- Fisheries managers should ensure that safety issues be included as an integral part of fisheries management and development.
- A national register of all types of fishing vessels and all active fishers should be kept and updated on an annual basis.
- There should be more emphasis on the various safety interventions for small vessels of less than 24 m in length overall (LOA), which are likely to grow in numbers and importance in the future.
- Each country should appoint an agency with a full mandate to record and analyse the causes of accidents at sea.
- Countries should consider it a priority to remove or reduce import duty and/or grant subsidies for the import of engine spares, and communications and life-saving equipment in order to make these items more readily accessible to the fishing community.
- The local fishing community should be sensitized and be more exposed to safety at sea programmes.

In the discussions following the presentation, the participants from the four countries commented that the study had adequately covered their national safety at sea situation for small-scale fishers. They indicated that they would provide further updates in their country presentations.

In addition, the participant from Kenya pointed out that his country needed specific fisheries legislation to deal with the safety at sea issues in particular for the inland freshwater fishery. The problem of HIV-AIDS was mentioned as a specific problem for small-scale fishers on Lake Victoria owing to the mobility of the fishing community.

The Malagasy participants stressed that the traditional (non-motorized) fishery was affected more directly by the problem of safety at sea, which was aggravated by the absence of accident records.

They also drew attention to the differences in the coastline configuration between the east coast and the west coast of the country. This issue, which has a direct bearing on small-scale fishing activities, was highlighted in the consultant's report.

Chapter 3
Other studies

The "FAO global programme on safety at sea for small-scale fisheries in developing countries", the "Safety at sea initiatives for artisanal fisheries in Grenada", and the study by the SSPA/Swedish International Development Cooperation Agency (SSPA/SIDA) on "Small fishing vessel safety as an integral part of sustainable coastal development" were presented. This chapter summarizes the main points of each study. The full text of the presentations is provided in Annex 5.

THE FAO GLOBAL PROGRAMME ON SAFETY AT SEA

This study was presented by Mr Hans Bage, Fishery Industry Officer (Small-scale Fisheries).

The immediate objective of the programme is to decrease the number of accidents at sea and the effects of such accidents, while the long-term objective is to improve livelihoods for the coastal population and in particular for the small-scale fishers.

The programme targets the following groups:

- fisheries policy-makers and managers;
- industry representatives;
- fishworkers' organizations;
- other stakeholders;
- relevant non-governmental organizations (NGOs);
- the fishers and their families.

Phase 1 of the programme consists of: the analysis of available information on the causes of accidents; field studies; and a workshop to discuss the results and plan the next step.

To date, analyses of available information have been conducted in three main regions: West Africa; the Caribbean Islands; and the South Pacific.

The main causes of small-vessel accidents in West African countries were different depending on the type of coastline. In the island state of the Republic of Cape Verde, capsizing, grounding and fire on board were the main causes, while engine failure was the main contributing factor. In the archipelago of the Republic of Guinea-Bissau, fire on board and injuries were main factors, with wind and waves contributing. Finally, in the five countries with open coastline, conflict with industrial fishing vessels resulting in collisions, dragging of nets and entangling of gear was the main reason for accidents, while capsizing caused by waves and wind ranked second.

In the Caribbean Islands, the main causes included: a decline in the standards of maintenance and boat-building techniques; and small vessels operating far out coupled with a lack of enforcement of safety equipment.

In the South Pacific, a study including analyses of cause of accidents was conducted in 1991. The main problems highlighted included: lack of maintenance of outboard engines; and rough weather causing poor visibility for the small islands.

Further field studies have been undertaken in South Pacific (2003), East Africa (2006 – above), and Latin America (December 2006).

The recommendations from the 2003 South Pacific field study included:

- Sensitize fisheries managers about the importance of including sea safety in fisheries management plans.
- Focus more attention on small-scale fishing vessel safety.
- Improve the recording and analysis of sea accidents.
- Improve sea awareness programmes.

The following workshops on sea safety have been or will be organized: South Pacific expert consultation (February 2003); Comoros workshop (December 2006); and Latin America (June 2007).

The programme formulation phase will include:

- elaboration of project proposals;
- agreements for field activities;
- assessment of needs for guidelines, standards, workshops, etc.

The programme implementation phase will include:

- project implementation at country/regional level;
- production of guidelines, standards etc.

The expected output will be specified interventions that will improve safety at sea for small-scale fishers.

SEA SAFETY IN GRENADA

Mr Roland Baldeo, Technologist, Fisheries Division, Grenada, gave a presentation on safety at sea initiatives for the artisanal fisheries in Grenada.

Mr Baldeo presented information on the numbers and types of fishing vessels operating in the surface longline fishery in Grenada. He explained the main fisheries communications systems being utilized. These include three VHF marine repeaters, which are installed on the highest mountains and enable two-way communication between fishing vessels 100 nautical miles (185 km) out to sea, and the land-based transceivers. These have permitted fishers to exploit fishing grounds farther away in the knowledge that in the event of an accident they can receive assistance from the coastguard. In addition to VHF radio, most fishing vessels in Grenada are equipped with Global Positioning System (GPS), a compass, flares, life jackets and navigation lights. Fisheries division staff organize regular training programmes for the captains and crews in all fishing villages.

Mr Baldeo emphasized the importance of public awareness programmes on radio and television organized by the fisheries authorities and the fact that all fishing vessels have to pass an annual inspection test that authorizes them to navigate. Fishers who pass the inspection programmes can benefit from duty-free concessions when importing fishing boats, fishing gear, and navigational and communications equipment, and they benefit from rebates on fuel purchased. Fuel payment rebates are paid to fishers every six months provided their vessels have passed the safety inspection and their fishing licences have been renewed.

He concluded by explaining that this programme had helped to reduce the number of accidents at sea, mainly owing to the fact that fishing vessels are better equipped with safety items, and fishers are more competent in all aspects of boat handling and sailing skills.

SMALL FISHING VESSEL SAFETY AS AN INTEGRATED PART OF SUSTAINABLE DEVELOPMENT

Mr Jim Sandkvist, SSPA/SIDA, Swedish representative, presented this study.

Mr Sandkvist emphasized that small fishing vessel safety is an integral part of sustainable coastal development. A wide and comprehensive approach is expected. Improvements in safety depend on legislation and regulations, such as the upcoming FAO stability regulations.

However, enforcement and inspection capacities have to be considered before implementation. Fishery management and fish quality aspects also contribute to improved safety. Fishing contributes considerably to local and national economic development. In many regions, artisanal fishing is the only family income source. In order to improve safety and to encourage fishers to adopt safety methods, invest in safety equipment, etc., it is necessary that they gain control of their resources (ownership, payback possibilities, etc.). As a part of coastal development, gender issues have to be considered.

Mr Sandkvist reported from field studies of small fishing boat construction in India and the United Republic of Tanzania. The introduction of modern materials (e.g. fibreglass) increases considerably the possibilities of improving boat size and capacity. Modern materials also put new demands on safety aspects in terms of design, buoyancy and maintenance.

Mr Sandkvist also discussed the efficiency and design of weather forecasting services as early warning systems. He pointed out that reaching fishers on the beach with proper information and warnings was not only a question of broadcasting systems. Organizational matters are of the utmost importance. All links in the information chain from the national weather service through the local municipality and the local radio station to the local fishers and their families need to be connected and operational. The information also has to be relevant and useful. Weather forecasting services and early warning system information depend on various time scales (as a function of natural phenomena development and information transit times). Forecasts and warnings need to be integrated parts and to provide input in emergency and operational plans on local levels. He concluded that improved knowledge and awareness about natural hazards and forecasting possibilities have an impact on long-term planning, capacity building, training and development, all in order to improve the safety of fishers.

Chapter 4
Country presentations

Representatives from Comoros, Kenya, Madagascar, Maldives, Mauritius, Seychelles, United Republic of Tanzania, and Yemen presented the situation of safety at sea for their respective countries. This chapter presents a summary of each presentation. Annex 6 provides the full text of the presentations.

COMOROS

The small-scale artisanal fishery in the Comoros evolved considerably in the 1980s with the widespread utilization of outboard motors on traditional canoes and the introduction of motorized fibreglass vessels.

Although fishers consider navigation between the three main islands (i.e. Moheli, Grande Comore and Anjoun) to be safe, it is in fact risky as most vessels do not carry any sea safety equipment and only use the mountain peaks of the three islands for taking bearings.

Outboard-powered vessels are used for the surface troll fishery. However, these often break down because of overheating, one of the main causes of accidents at sea. The information presented indicated the severity of the problem:

Year	Boats lost at sea	Lives lost
2003	41	100
2004	24	120
2005	21	105

Therefore, there is an urgent need for the country to implement the following measures to improve the current safety at sea situation:

- compile an inventory, and register all fishing vessels;
- train mechanics in the repair and maintenance of outboard engines;
- provide relevant training on the use of navigational and communications equipment;
- provide fishers with all the technical support for safe navigation and marine expertise;
- sensitize fishers on the issues of safety at sea;
- raise awareness of the maritime code and fisheries regulations;
- provide training in the repair and maintenance of fibreglass vessels.

KENYA

Capture fisheries account for the bulk of total fish production in Kenya, with annual landings of 140 000 tonnes. Only 5 percent of the catch (7 000 tonnes) is from marine fisheries, with the rest coming from freshwater lakes, rivers and dams.

The main causes of accidents at sea include:

- unstable non-motorized boats;
- unpredictable weather (especially during the southeast monsoon);
- lack of lights on small vessels at night;
- poor vessel construction;
- overloading.

The following government agencies are involved in boat safety:
- Fisheries Department;
- Kenyan Port Authority;
- Kenya Marine Authority;
- Kenya Meteorological Department;
- Kenya Marine and Fisheries Research Institute (KMFRI).

The main constraints and challenges include:
- low level of funding for enforcement and rescue operations;
- poor training of fisheries officers and fishers in sea safety;
- low level of literacy among fishers;
- lack of purchasing power to acquire safety equipment;
- the need for improved coordination between agencies for small vessel sea safety.

MADAGASCAR

The Malagasy participants provided statistics on the number of fishers involved in the traditional fishery, the number and types of vessels involved in this fishery, and the operating range of the vessels.

The main problems relating to this fishery include:
- very basic fishing techniques;
- no security equipment;
- a lack of organization;
- more than 68 percent of the fishers are illiterate;
- the fishing villages are completely isolated and remote from urban centres with no means of communication.

There are several national agencies with a mandate for security at sea, but no single agency with an overall mandate. The main causes of accidents at sea include:
- vulnerability of traditional canoes;
- sudden changes in wind patterns;
- fishing too far offshore;
- lack of sea safety equipment;
- disorientation.

Some preventive measures taken by the fishers include: taking members of the crew from different families; and other fishers assisting when crossing dangerous passes or entering river basins on returning from fishing trips.

Certain past and/or ongoing projects have played an important role in improving security at sea. The most important of these include:
- the Japanese grant aid project, which included fibreglass vessels equipped with security equipment;
- the setting up of the Centre for Fisheries Surveillance (CSP), which consists of:
  – coastal surveillance by rapid launches;
  – aerial surveillance;
  – search and rescue operations.
- the Zone d'Aménagement Concerté (ZAC) project, to assist the various stakeholders in the management of shrimp resources and to improve security at sea.

MALDIVES

In their presentation, the Maldivian participants stressed the importance of boat design and sound vessel construction for security at sea.

In the 1980s, vessels powered by sails and paddles were replaced gradually by diesel engines, and vessel hulls were modernized in order to cope with this change. In the 1990s, diesel-powered engine almost entirely replaced sail-propelled vessels, and a new generation of larger fibreglass vessel replaced all-wooden vessels. Replacement vessels for those lost in the 2004 tsunami have been designed to improve stability and the structural integrity of the deck.

In addition to these improved designs, the availability and use of electronic communications and navigational equipment, such as mobile phones, GPS and echo sounders, have improved safety at sea.

The Maldivian participants concluded that there was a need for good boat-building standards in order to maintain the present record of safety and that they should be cautious about building fibreglass boats of more than 30 m in length.

MAURITIUS

The participants from Mauritius gave information on the number of fishers involved in the traditional small-scale fishery and on the most important types of fishing operations. The main institutions involved in sea safety include the National Coast Guard and the Fisheries Division (Fisheries Training, Extension Centre, Fishermen Welfare Fund, and Fisheries Protection Service). Safety awareness and training programmes for fishers have included sensitization campaigns (seminars, meetings, exhibitions, and the publication of posters and brochures) and training by the Fisheries Training and Extension Centre (FITEC).

Measures in place to prevent/reduce accidents at sea include:

- allowance for not fishing during bad weather;
- free distribution of safety equipment (life jackets, life buoys, flares);
- loans and duty concessions;
- sickness benefits and group insurance.

According to the participants, some of the measures have been costly and difficult to sustain. In the last five years, 33 fishers have been lost at sea, 397 fishers have been lost and rescued, and 85 fatalities have been recorded.

The main causes of accidents are:

- defects in boat construction;
- mechanical problems;
- late or no call for assistance;
- inability to provide necessary information to rescue centres;
- failure to use life-saving equipment;
- adverse weather conditions;
- drunkenness.

New measures introduced to enhance safety at sea for fishers include:

- regulations on checking boat seaworthiness;
- requirements for fishers registration cards;
- provisions for training skippers of vessels of less than 24 m.

SEYCHELLES

The participants from Seychelles provided information and updates on the small fishing vessel communication systems (EPIRBs and a vessel monitoring system [VMS]) being installed by the Seychelles Fishing Authority (SFA) on small fishing vessels. They also presented recent information on the newly created agency, the Seychelles Maritime Authority (SMA).

In brief, they informed the workshop that:

- The 20 EPIRBs emitting on 121.5 MHz that had been placed on small fishing vessels in 1995 will be phased out by 2007 and be replaced by 30 new EPIRBs emitting on 406 MHz that can be detected by satellites.
- The SFA has equipped small-scale artisanal vessels with VMS transceivers, and another 110 vessels with autonomous power supply will also be equipped by 2007.
- The VMS has considerably reduced and facilitated search and rescue operations that are usually carried out by the coastguard.

The SMA is currently responsible for the certification of vessels (excluding fishing vessels) and issue seaworthiness certificates. It is the sole agency (created in October 2004) with the mandate to record and analyse all accidents at sea. The SMA is currently working on a "Small Fishing Vessels Regulations" that will soon become law. This agency works in close cooperation with the coastguard and the SFA to implement small fishing boat safety regulations. It is hoped that the situation will have improved by 2007, when the SMA will also be in a position to survey and certify all small-scale fishing vessels in Seychelles.

UNITED REPUBLIC OF TANZANIA

The participants from the United Republic of Tanzania described the traditional fishing sector and provided relevant statistics on the types of vessel used, the fishing gear and the number of fishers involved in this fishery.

The agencies responsible for enforcement of safety at sea regulations include the Marine Transport Regulatory Authority (SUMATRA), Tanzania Harbours Authority (THA), and Tanzania Meteorological Agency (TMA). The TMA plays a key role as it provides fishers with the weather forecasts to decide whether they can go to sea.

In addition, two training centres provide training for personnel in the fishing industry. The Mbegani Fisheries Development Centre offers courses in navigation, gear technology and survival at sea; and the Dar es Salaam Maritime Institute (DMI) offers fishers and skippers training in safety at sea and navigation.

The main reasons why fishers do not comply with safety standards include:

- Fishers are too poor to purchase safety equipment or seaworthy vessels.
- The authorities do not monitor or enforce the safety regulations.
- No adequate records are kept of accidents at sea or of fishers/vessels lost at sea.
- Fishers do not reports accidents at sea to the authorities.

The proposed measures to improve safety at sea include:

- sensitizing fishers on safety at sea issues;
- monitoring compliance in order to ensure laws are respected;
- providing subsidies and reducing import duties on safety equipment so that fishers can afford it;
- ensuring the availability of improved fishing vessels by providing subsidies for fibreglass vessels and by waiving import duty on materials for building vessels.

YEMEN

The Yemeni participants described the traditional fishing sector of Yemen and provided statistics on numbers and types of fishing vessels. Their recommendations for improving safety at sea for small-scale vessels in Yemen were:

- Implement and enforce the current regulations concerning safety at sea, including the monitoring and use of safety equipment.

- Raise the awareness of small-scale fishers about the importance of training in safety at sea through workshops and extension programmes.
- Produce more guidelines, posters, brochures, etc. in order to emphasize the importance of safety at sea.
- Ensure that life-saving equipment is available on the local market at a reasonable price (subsidized).
- Establish meteorological stations along the Yemeni coastline to provide regular and accurate forecasts to fishers.
- Establish several fishing vessel and engine maintenance workshops along the Yemeni coastline.

Chapter 5
Conclusions and recommendations

The second half of the three-day workshop was given over to four working groups. These were each instructed to draw conclusions and make recommendations on one of the four themes presented: fishing operations; data collection; legal framework; and technology. Annexes 7 and 8 provide the complete text of the conclusions and recommendations of the four working groups.

The main conclusions and recommendations of the four working groups were presented in the plenary sessions and are set out below.

GROUP 1: FISHING OPERATIONS

The group concluded that fishing boats should be well maintained and equipped with the proper life-saving and communications equipment. It is the responsibility of the boat-owner to supply the necessary equipment while the boat captain has the responsibility for verifying the equipment. Both the captain and crew should be well trained in the use of safety, navigational and communications equipment. However, it was stressed that safety standards need not be equal; all countries should be assisted as per their current situation so that their safety standards can be brought up to international standards.

The group recommended that the law should be amended/improved/strengthened to provide for a minimum mandatory safety requirement for fishing vessels. However, standards should be set at a relatively low level with provisions of subsidies and credit facilities for the purchase of safety equipment. Fisheries authorities should be the lead agencies, with national governments and banks providing funds for the acquisition of safety equipment. Donor agencies should be the main source of funding for the provision of infrastructure support, such as engine repair and maintenance facilities.

GROUP 2: DATA COLLECTION

The group concluded that there was a need to have a single lead agency responsible for collecting and analysing data on accidents at sea. However, it was important to decide which data should be collected, but certain information, such as the number of boats, safety equipment on board, causes of accidents, vessel and crew registration certificates, and annual inspection records, should always be included.

The group recommended that, at national level, each country should set up a long-term system of collection, storage and analysis of data on safety at sea. At regional level, countries should be prepared to provide information regularly to a regional body such as the SWIOFC. The regional organization should be prepared to make this information available to the countries of the region in a newsletter or bulletin. This information should be reviewed periodically to draw the attention of member countries to the status of safety at sea regionally, taking into consideration the sensitive nature of the information.

GROUP 3: LEGAL FRAMEWORK

The group concluded that, in general, there has been a lack of political will, which has led to an absence of a coherent framework for fisheries development/management, quality control, safety at sea, etc. The group stressed that, in general, safety at sea legislation was lacking in most countries, and that where legislation did exist, there was insufficient implementation with a general lack of awareness on sea safety issues.

The group made several recommendations, including:

- Generate sufficient political will to address sea safety issues in relation to fishing, in particular for saving lives and property.
- Integrate sea safety programmes into fisheries development and management programmes in a coherent manner.
- Develop and implement appropriate legislation/policy at different levels, in particular in the small-scale fishing sector.
- Develop capacity at regional, national and local level to implement and enforce sea safety measures.
- Provide subsidies to fishers for acquiring equipment that is essential for their safety at sea, as well as assist in training needs.
- Develop awareness programmes on safety at sea among small-scale fishing communities.

GROUP 4: TECHNOLOGY

The group came to two main conclusions:

- The advantages and constraints of fibreglass versus wooden vessels should be considered in the light of vessel safety and depending on the availability of construction materials, the natural environment, and the specifics of the region.
- A non-exhaustive list of safety equipment considered essential for any small fishing vessel going to sea (e.g. radios, life jackets, flares, anchors, and mooring rope).

The group made the following recommendations:

- Concerning fibreglass vessels: Maintenance workshops should be more readily available, with fishing communities and cooperatives participating in the operation of workshops and in boat design. Standards for boat designs and construction of vessels made of fibreglass reinforced plastic (FRP) should be introduced, with designs suitable for different environments.
- Concerning wooden vessels: They should be promoted where their use is safer (e.g. rocky shores, and reefs), and a credit system should be organized for their maintenance.
- Concerning training: Training should be provided for engine maintenance, repair, and operation, and in the installation of navigation and communications equipment. Training should also be provided in the design, maintenance and building of FRP vessels.
- Fishers should have access to high-quality fuel, lubricants, engines and spare parts.

FINAL RECOMMENDATIONS

The chairperson reiterated the point that the countries of the SWIO present at the workshop recognize that fishing is one of the most dangerous and vulnerable of professions and that small-scale fishers require assistance. He believed that the implementation of the recommendations could help to improve safety at sea and enhance the livelihoods of small-scale fishers and their families.

The 11 final recommendations presented were:

- Generate commitment and political will at national level to improve small vessel sea safety.
- Increase the effectiveness of ongoing sea safety awareness programmes.
- Identify a lead agency to deal with safety at sea for all small-scale fishers.
- Develop, enact and implement appropriate legislation for small fishing vessels, including fisheries management and safety regulations as mandatory requirements.
- Create an appropriate database for the analysis, collection and dissemination of safety at sea data.
- Develop formal and informal training, including extension services directed at fishers, fishing communities and other concerned stakeholders.
- Tie the registering of fishing vessels with fishing authorizations and the issuing of inspection certificates.
- Consider the inclusion of sea safety as an integral part of fisheries management and development initiatives.

- Give access to credit for spare parts, fishing gear, and consider the possible use of subsidies linked to the certification of the vessel.
- Establish insurance schemes and the processing of social security benefits for fisher families following the loss of lives.
- In implementing the above recommendation, give special consideration to the diversity of fishing operations, whether they are coastal or offshore, and the meteorological conditions.

IMPLEMENTING THE FINAL RECOMMENDATIONS

On its last afternoon, the workshop focused on the implementation of the final recommendations.

Some of the recommendations were based on recurring themes from the group discussions. These important points include:

- Several themes were mentioned repeatedly in conjunction with implementing the recommendations: a national sea awareness programme with emphasis on enacting appropriate national legislation to improve safety at sea. In this respect, the generation of political will at national and regional level is important, and full use of the media (press, television, radio, etc.) must be made in order to ensure that the message is received. It is necessary for individual countries to recognize the need for such legislation to improve safety at sea, and it is probably best to use model international legislation (International Maritime Organization [IMO], FAO) that has considerable flexibility for modifications to suit national requirements.
- Although international or regional organization (e.g. SWIOFC) can assist in the implementation of sea safety recommendations, sea safety is ultimately a national responsibility, and the national efforts to improve sea safety must be continuous. Such efforts must be formulated so that local resources, whether government, the private sector or NGOs, continue to participate after the completion of any initial regional or international assistance.
- There is a vital need for consultations in particular with fishers and the community for implementing many of the recommendations outlined above. Stakeholders in the industry should be consulted and asked to participate in any safety at sea campaigns. Existing local capacity should be used, with the focus on training at the workplace and in the community rather than institutional training. Informal training could include NGOs, extension services, etc.
- Improving sea safety is a relatively new undertaking for many SWIO countries. This process could be accelerated by learning from certain national initiatives such as road safety, AIDS awareness and other national awareness campaigns.
- The private sector, including boat-builders, outboard-engine distributors and fuel companies, could have a broader role to play in efforts to improve national sea safety. This could include promotion of training, membership on coordinating committees, provision of funding, and assisting in awareness campaigns.

Annex 9 presents recommendations on how countries can apply the lessons learned by Grenada to improve safety at sea for fishers.

Annex 1
Opening speeches

SPEECH BY MR JEREMY TURNER, CHIEF, FISHING TECHNOLOGY SERVICE, FAO

"Minister,
Distinguished delegates from the member States of the SWIOFC,
Ladies and gentlemen,

On behalf of the Director-General of FAO and of the Assistant Director-General of the Fisheries and Aquaculture Department, Mr Ichiro Nomura, I take great pleasure in opening this Workshop on Safety at Sea for Small-scale Fisheries in the South West Indian Ocean, which has been organized jointly by the SWIOFC and FAO.

Fishing is considered to be the world's most dangerous occupation, with an estimated 24 000 deaths per year. Safety at sea involves several interrelated components, but social and economic issues as well as overfishing of coastal resources are probably among the major factors that have negated the results of efforts to improve safety at sea.

Over the last 50 years, landings from marine capture fisheries have increased from about 20 million tonnes to 86 million tonnes. During this period, the fishing industry has been greatly affected by political, social, economic and technological changes, which have led inexorably to increased pressure on fish resources. Consequently, fisheries administrations have recognized that they need to be better aware of the states of their fisheries, to implement effective policies to prevent resource depletion and the wastage of fishery inputs, and, increasingly, to facilitate stock rehabilitation. While the extent and impacts of these types of intervention vary considerably around the world, they tend to be more concerned with the long-term conservation and sustainable use of fisheries resources than with the welfare of those who harvest them.

However, while maritime administrations have the safety of seafarers as one of their prime concerns, they frequently have difficulty in adequately addressing the safety of fishers because the nature of fishing operations is so different from that of the cargo-related activities with which they are more familiar. Some obvious examples:

- Merchant vessels load and unload their cargo in the safety of the harbour, fishing vessels on the other hand have to hunt for and load their cargo at sea, often in dangerous conditions.
- Merchant vessels have their hatches firmly closed at sea, fishing vessels are frequently required to have their hatches open at sea.
- The loading condition of a merchant vessel remains fairly constant throughout a voyage and, thus, so do its stability characteristics.
- Fishing vessels gradually increase their cargo throughout their trips, and their stability characteristics are continually changing also.

For these and other reasons, fishing vessels are excluded from the vast majority of provisions of international shipping conventions drawn up by bodies like the IMO, and to this day, there is no international convention in force dealing with the safety of fishing vessels or the training of their crews. The effect of this dilemma is that, in many countries, the issue of fishing vessel safety is falling between the fisheries and maritime administrations, and not being adequately addressed by either.

This is not to suggest that fishers' safety can only be tackled through conventions, safety regulation and enforcement. There are a number of areas where improvements can be made, for example, provision and analysis of data identifying the root and actual causes of accidents (the problems cannot be addressed until they have been defined); the training and certification of skippers and crews (at the simplest, this might be a requirement for one member of the crew to be trained and certified in the emergency repair of the engine); more effective and holistic fisheries management, which considers the impact of fisheries management regimes on the operations and safety of fishing vessels. All of these can lead to improvements. But the fact is that even in some of those countries where these measures are in progress, fishing-related deaths are on the increase. This is not because in those same countries there are increasing numbers of fishers, or because their boats are less well built than they used to be – the reverse is more likely to be the case. It is more likely to be the result of economic pressures. In the face of declining resources, operators must be more competitive, and so they may invest more in speed and fish-finders, and spend less on crew costs, maintenance and safety equipment. Operators may push their boats further offshore in worse weather. Cutting crew sizes leads to fatigue and stress, and errors and ultimately to an attitudinal problem – a high risk of loss of life has been accepted as part of the fishing culture. This attitude is one that can be corrected by concerted effort from within the family and the community, as well as through government institutions. And indeed, it is important that it should be. The consequences of loss of life fall heavily on the dependants. In many communities in the Asia and Africa regions, the consequences of losing a husband can be devastating – a widow may have a low social standing, and where there is no welfare state to support the family and without alternative sources of income, the widow and her children may face destitution.

The Code of Conduct for Responsible Fisheries notes that it is the duty of all States to "ensure that fishing facilities and equipment as well as all fisheries activities allow for safe, healthy and fair working and living conditions and meet internationally agreed standards adopted by relevant international organizations".

How can states comply with this duty? Unsafe vessels could be eliminated. Safety equipment could be the subject of mandatory installation and servicing requirements. Awareness of stability issues could be achieved by mandatory training and education. Beach-based training on how to respond to emergencies at sea and how to use survival gear could be introduced for all crews. While there is no shortage of types of intervention, they are unlikely to be effective without a sound understanding of the main causes of accidents, thus emphasizing the need for good data.

It is obvious that the above-mentioned examples cannot be implemented overnight. But without them and others like them, any substantial improvement in safety at sea for current and future generations of fishermen is not achievable. Moreover, without them, fishers will not be able to achieve a corresponding degree of social respect or status in acknowledgement of their membership of a professional group having recognized skills, expertise, standards and responsibilities. Without that social respect or status, many small-scale and artisanal fisher communities will continue to exert little influence in society on the most fundamental issues that concern them, such as health, education, infrastructure, in whose absence they will remain marginalized communities, left at the control of those who are able to exploit them.

In order to achieve progress in meaningfully implementing the types of measures described in the examples above, an enabling environment is a prerequisite. By this, I mean that sustainable results will not be achievable without political will, motivation and commitment. This is one of the purposes of our workshop. We, as senior administrators, should end this week with a wider understanding of the scale, nature and consequences of the problem throughout the region, and equally, we should be aware that the problem is not insurmountable. And further, it is the hope of FAO and the SWIOFC that you should resolve to undertake this task, by building a foundation on which to formulate a comprehensive programme of activities that will include the involvement of

all stakeholders. For some of the countries here, this process is about to start; for others, progress has been made and the sharing of experiences will be useful. By virtue of our presence in Comoros this week, we have accepted a great responsibility and we have been provided with an opportunity, and I wish all of us the determination to succeed."

SPEECH READ ON BEHALF OF THE FAO REPRESENTATIVE FOR THE COMOROS BY AUBREY HARRIS, SENIOR FISHERIES OFFICER, FAO SUBREGIONAL OFFICE FOR SOUTHERN AFRICA

"Minister,
Director of Fishery Resources,
Directors and Representatives of the Ministry of Agriculture,
Representatives of international organizations,
Representatives and Participants of member countries,
Dear Colleagues,

Opening this Workshop on Safety at Sea for Small-scale Fisheries in the South West Indian Ocean, it is an honour for me to say a few words on behalf of the FAO Representative for the Comoros, who resides in Madagascar and expresses his regrets for not being able to attend the opening of this important meeting this morning.

He asked me to congratulate the organizers for taking the initiative to hold a workshop on an issue of particular significance for the fishers in the South West Indian Ocean region and which is the key to sustainable and human development in the small-scale fishery sector. The accident rate among fishers is very high, and the loss of lives causes profound distress within families and fishers' organizations, as case studies in the Comoros and Madagascar have shown.

This workshop held in the Comoros provides an excellent opportunity for promoting the sharing of information and experiences in order to establish solutions and practical actions in view of strengthening safety at sea in the SWIOFC member countries.

I wish to extend my sincere appreciation to Her Excellency the Minister of the Comoros for agreeing to welcome participants from the Region in order to discuss an issue she is personally interested in, and to her team from the Fishery Resources Directorate for preparing and organizing this workshop.

The countries of the South West Indian Ocean (SWIO) form a homogeneous group sharing common marine resources and faced with similar fishery management problems. The development of a regional structure in the South West Indian Ocean is facilitated by FAO through funding from Sweden.

The work of the South West Indian Ocean Fishery Commission (SWIOFC) has shown the need for closer collaboration between the coastal states in view of sustainable fishery resource development. This regional body has enabled its member countries to better harmonize their strategies and regulations and will serve as a forum for negotiations on regional fishery management instruments.

The Commission will offer a direct response to management issues posed by new fishing methods and will take more into account potential contributions to sustainable fisheries in protected marine areas. It will also enable states to apply techniques that are appropriate for a sustainable use of fishery resources and to monitor effectively illegal and unregistered fishing, in accordance with the FAO code of conduct for responsible fisheries. Today's workshop will directly contribute to this objective.

Through its technical assistance programme, FAO provides significant support in the fishery sector at regional and country level. Sustainable development has been promoted through a series of FAO projects:

- in the Comoros, through the formulation of a national strategy and legal framework for the development of Comorian fisheries in 2004;
- in Madagascar, through the formulation of fishery management plans since 1993;
- in Seychelles and Mauritius, recently through specific studies on the sustainable use of fishery resources.

The FAO Representative for Comoros, Madagascar, Mauritius and Seychelles wishes you every success in the sharing of your experiences, and awaits with great interest the results of your deliberations. The Representative and his colleagues in the SWIOFC member countries are willing to follow up your recommendations.

Thank you."

OPENING SPEECH READ ON BEHALF OF THE MINISTER OF PRODUCTION, RURAL DEVELOPMENT, ENVIRONMENT AND FISHERIES, COMOROS, BY THE PERMANENT SECRETARY FOR FISHERIES AND AGRICULTURE

"Ladies and gentlemen,

Her Excellency the Minister of Agriculture in charge of fisheries would have liked to attend personally this important meeting but could not be present because of last-minute commitments. She gave me the pleasure of representing her, and it is on her behalf that I am addressing this meeting.

Today, we have the honour to organize this Workshop on Safety at Sea for Small-Scale Fisheries under the South West Indian Ocean Fishery Commission/FAO in collaboration with the National Directorate of Fishery Resources of the Comoros.

The fact that this important event is being held in the Comoros shows that the Comorian Government is concerned with strengthening regional cooperation in the field of fisheries in general and security at sea in particular.

Allow me, on behalf of the Comorian Government and the Minister of Agriculture, Fisheries, Industry, Craft and Environment to take this opportunity to welcome you and wish you a pleasant stay in our country.

As you know, the safety of fishermen at sea represents for our individual countries, and especially for the Comoros, a real problem that deserves attention from all of us. It is an issue that we need to be familiar with and address on the one hand and whose extent our decision-makers and administrations in the region need to be aware of.

This is why we, fishery officers, maritime technicians and professionals, have gathered here to identify the constraints that hamper efforts to improve the safety of artisanal fishermen and to promote regional strategies aimed at ensuring their safety in our respective countries and in our region.

Safety at sea and related issues are of crucial importance for the small-scale fishers in the South West Indian Ocean. In some countries, as is the case in the Comoros, accident rates among fishermen are very high, and losses of lives cause profound distress within families as well as communities and fishermen's organizations.

The South West Indian Ocean Fishery Commission (SWIOFC) has undertaken a study on safety at sea for small-scale fisheries. Its main findings and recommendations will be presented to you in the course of our work.

During our sessions, you will become familiar with the FAO/SIDA study on safety at sea in East Africa carried out in April 2005. This review represents a milestone in the development of strategies for safety at sea of small-scale fishermen. Based on this, as well as your relevant inputs, your task will be to:

- discuss the regional situation of safety at sea for artisanal fisheries in the South West Indian Ocean;
- share information on safety at sea programmes and activities;
- increase awareness of the extent of the problem among relevant decision-makers and administrations;
- identify constraints that have limited the efficiency of initiatives aimed at improving safety at sea and the means to eliminate these constraints;
- propose activities to strengthen safety at sea;
- prepare a draft proposal for a regional project on strengthening safety at sea in the region that will address both the legitimate desire of our governments to quickly obtain specific solutions to this problem and the need to put in place longer-term regional actions.

While insisting on this last point, let me express the wish that your discussions and reflections be guided by the constant concern for developing regional strategies to ensure the safety at sea of artisanal fishers.

Ladies and gentlemen, I hope all conditions are fulfilled to make your deliberations as fruitful as possible, and I also wish you a pleasant stay in Moroni.

Thank you for your kind attention, and all the best in your work.

I declare the Workshop on Safety at Sea for Small-scale Fisheries open.

Thank you."

Annex 2
Workshop agenda

Tuesday, 12 December 2006

Time	Event	Session topic and speakers
07.30– 09.00	Registration desk open	
09.00–10.30	Opening session	Welcomes
10.30–11.00	Break	
11.00–12.30.	Presentations	East African safety at sea study
12.30–13.45	Lunch break	
13.45–15.15	Presentations	3 speakers, FAO, Grenada, Asia
15.15–15.45	Break	
15.45 –17.15	Presentations	3 speakers

Wednesday, 13 December 2006

Time	Event	Session topic and speakers
08.00–09.00	Registration desk open	
09.00–10.30	Country presentations	3 speakers
10.30–11.00	Break	
11.00–12.30	Country presentations	3 speakers
12.30–13.45	Lunch break	
13.45–15.15	Country presentations	3 speakers
15.15–15.45.	Break	
15.45–17.15	Country presentations	2 speakers

Thursday, 14 December 2006

Time	Event	Session topic and speakers
08.00–09.00	Registration desk open	
09.00–09.30	Presentation	Visitor
09.30–10.30	Presentations	Summing up of presentations, defining group work
10.30–11.00	Break	
11.00–12.30	Presentations	group work
12.30–13.45	Lunch break	
13.45–15.15	Presentations	Presentations from working groups, discussions on future activities
15.15–15.45	Break	
15.45–16.45	Closing session	

Annex 3
List of participants

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Annex 4
Study on safety at sea for small-scale fisheries in the SWIO

Joël Nageon de Lestang, Consultant

OBJECTIVES OF THE STUDY

The main objectives of the study were:

- to assist in the development of regional strategies to improve safety at sea;
- to raise awareness of the problems with policy-makers and administrators;
- to identify constraints that have reduced the effectiveness of efforts to improve safety at sea.

SCOPE OF THE STUDY

The countries covered in the present study were: Comoros, Kenya, Madagascar and Seychelles. Six main themes were included:

- fisheries management and sea safety;
- safety programmes;
- data recording;
- fisheries legislation;
- boat-building and vessel design;
- other safety issues.

PRELIMINARY RESULTS

Fisheries management and sea safety

The concept of including safety at sea as an objective of fisheries management is not common for most of the countries covered in the study because:

- Fisheries management options are not considered a priority in most of the four countries studied. Hence, the concept of making provisions for saving lives at sea is generally not included in any fisheries development plan (except for Seychelles).
- The definition of fisheries management is limited to preserving fish stocks (closed and open season/quotas, etc.).
- Marine resources are under increasing fishing pressure and, hence, more emphasis is being placed on fisheries management rather than fisheries development.

Safety programmes

Successes

Safety programmes that have been proposed and at times implemented successfully in the fisheries sector relate to:

- a gradual shift from building fishing vessels made of wood to fibreglass-built vessels, which are sturdier and more seaworthy;
- increasing the availability of basic safety equipment, sometimes at subsidized prices (mostly funded by donor agencies);
- the concept of registering all fishing vessels – this is becoming more widely accepted, also by fishers;
- a concerted effort to update and revise safety regulations for small fishing vessels even if the law is not always applied;
- serious attempts to include or upgrade safety equipment when building and/or refurbishing a fishing vessel (navigation lights, buoyancy tanks, compasses, life rings, radar reflectors, etc.).

- the importance of upgrading vessel communications and detection systems (VMS transceivers, GPS, radios, EPIRBs, etc.).

Reasons for failure

The main reasons why safety at sea programmes have not always been a success include:

- Donating safety equipment to fishers free of charge without a long-term plan for self-acquisition or replacement. Giving advanced electronic safety equipment to fishers without giving adequate training.
- In all four countries (but particular in Madagascar and Kenya), there appears to be a lack of exposure to safety awareness on a recurring basis with the result that it is being ignored.
- Poor enforcement and monitoring of safety regulations.
- Failure on the part of governments to have adequate search and rescue vessels and trained manpower to organize credible search and rescue operations.
- Lack of proper training programmes for fishers (maritime training schools have been a failure in most of the countries surveyed).
- Too many government agencies with responsibility for safety at sea programmes, with no single agency having overall responsibility for implementing such programmes.

Data recording

Up to 2005, none of the four countries had an agency with the specific responsibility to keep a record of all accidents at sea. As of last year, an authority has been created in Seychelles, Madagascar and Kenya to fulfil this role. However, it appears that this responsibility is only being shouldered in Seychelles and, perhaps Madagascar, with the Kenyan authority still not prepared to assume full responsibility. As for the Comoros, although the various authorities are very conscious of security at sea problems and it is the country with the highest rate of accidents at sea, no one appears to be prepared to change the status quo.

Fisheries legislation

Only in Seychelles have the authorities taken this issue seriously, and a "Small Fishing Vessels Safety Regulations" has been prepared and should be enacted in the near future. Madagascar is also following suit but a lack of political will means that it will take a while for the legislation to be passed and adopted.

In the Comoros, legislation has been in the pipeline since the early 1980s but nothing concrete has been adopted yet. It appears that, unless the new government makes a special effort to do so, it will not be adopted soon.

In Kenya, there is much discussion on proposed new fisheries legislation but it appears that no special provision is being made to include safety at sea issues in the new legislation. The problem stems mainly from the fact that marine fisheries in Kenya account for only 5 percent of total fish landings and it is not given any priority by the authorities concerned.

Boat-building and vessel design

In all four countries, considerable efforts have been made to improve vessel design and boat construction, with the general trend being to move away from wooden vessels to building vessels out of fibreglass (Table A4.1). However, it is not clear whether this has been done with the objective of improving safety at sea or simply to improve seaworthiness so that fishers can travel further offshore. However, the safety features of fibreglass-built vessels cannot be ignored.

Other safety issues

There is a need to increase the availability of communications and navigational equipment, spare parts and training to artisanal fishers; with a concerted effort by government to subsidize or eliminate import duties on such items in order to make them affordable to artisanal fishers.

There also need to be more publicity/awareness programmes to sensitize the public and emphasize the necessity for safety at sea programmes on a long-term basis.

TABLE A4.1
Vessel types, causes of accidents and main constraints and challenges

Country	Fishing techniques	Boat types/LOA (m)	No. of boats/ construction material	Cause of accidents	Main constraints/Challenges
Seychelles	Handlining Traps Longlining Nets Diving	Open boat, 5–7 Whalers, 6–12 Semi-decked, 6–9 Decked, 9–10 Schooners, 10–15 Longliners, 14–22	280, FRP 91, wood, FRP 30, FRP 25, FRP 16, wood/FRP 7, FRP	Bad weather Engine breakdown Unseaworthy Lack of security equipment	Availability & cost of security equipment Code of standard for boat-building (certify boatyards) No small-vessel regulations No fishing boat surveys Inadequate vessel registration (60%) No records of accidents & analysis of data
Madagascar	Handlining Nets (gill nets/ trawling) Diving	Traditional non-motorized pirogues / 3–4 Artisanal vessels < 40 hp	22 000, wood 500, FRP, wood	Changing weather No security equipment Collisions No lights Inhospitable east coast Not motorized Lack of search & rescue No meteorological forecast	Lack of training Lack of search & rescue Availability and cost of security equipment Remote fishing villages (communication poor) Unmotorized vessels Improved weather forecasts No records of sea data
Comoros	Trolling Handlining Traps	Non-motorized, 4–7 Motorized open vessels	3 500, wood, FRP 1 500, FRP	Mechanical breakdown No safety equipment Non-motorized vessels Lack of training in engine repairs Lack of search & rescue	Improved training in engine repairs Navigation & sea safety measures Registration of vessels / data collection Improved search & rescue Raise awareness on sea safety
Kenya	Handlining Traps Gill nets	Non-motorized canoes, 3–5 Motorized open vessels, 5–10	2 233, wood 135, wood, FRP	Unpredictable weather Unstable, poor construction Non-motorized vessels Lack of lights (collisions) Overloading	Availability & cost of safety equipment No credit facilities Lack of search & rescue Registration of vessels / no data

ACCIDENTS

The main factors in accidents at sea are:

- Unpredictable weather patterns with strong winds and currents at certain times of the year (southeast monsoon). Non-motorized vessels face particular problems during such periods.
- Engine/electrical system breakdowns (battery problems) as a result of poor maintenance, lack of spare parts and poor training (battery/electrical problems).
- Collisions at sea between industrial and artisanal vessels. Tuna purse seiners / shrimp industrial trawlers fish on the same grounds as artisanal vessels. Small vessels often show no lights during night fishing.

- No buoyancy tanks (vessels sink rapidly).
- Vessels do not undergo annual inspection (for insurance purpose).

The inability to cope with accidents at sea is mostly related to the following factors:
- a lack and/or high price of communications equipment (radios, mobile phones, EPIRBs);
- a lack of navigational equipment (compasses, GPS);
- a lack of safety equipment (flares, life jackets, life rafts);
- a lack of organized search and rescue operations (fishers do not give fishing position, rescue operations start too late);
- a lack of proper crew training in emergency situations.

The present safety at sea situation can be improved by:
- education and training programmes;
- raising public awareness;
- registration of fishing vessels and fishers;
- improved safety at sea legislation (for small vessels);
- increased availability of spare parts and life-saving equipment.

COUNTRY-SPECIFIC PROBLEMS

Small island states (Seychelles and Comoros) suffer from the following specific problems:
- Fishers have to fish farther offshore and stay longer at sea owing to depleting coastal resources.
- In the case of Seychelles, fishers have to fish up to the edge of the Plateau (150 km).
- In the case of the Comoros, fishers travel up to Mozambican waters (80–100 km).
- Both countries suffer from the following specific problems:
  – a growing population in the coastal zone;
  – a lack of adequate meteorological services;
  – they are more prone to natural disasters such as cyclones, tsunamis, flooding, etc.

Coastal states with large open coastlines, such as Madagascar and Kenya, suffer from the following specific problems:
- Communication systems are more difficult as the population is more dispersed and far from the main urban centres.
- There is a lack of coastal infrastructure (ports, gear, safety equipment, and market outlets) and sheltered areas.
- They depend more heavily on non-motorized vessels (sail/paddles). In Madagascar, 99.4 percent of fishing vessels are non-motorized (94 percent in Kenya).
- Difficulty in enforcement, registration of vessels, search and rescue, and data collection.
- Fishers generally have very limited access to credit facilities.

IMPROVING SAFETY AT SEA

The measures to improve safety at sea with limited funding include:
- local manufacture of safety equipment (life rafts, lights, anchors, mooring rope, etc.);
- the use of basic equipment (short-wave radios, and mobiles phones);
- not taking unwarranted risks (distance from shore and length of fishing trips);
- fishers abiding by basic safety regulations and being aware of changing weather patterns;
- fishers knowing the limitations of their vessels.

Annex 5
Other studies

FAO GLOBAL PROGRAMME ON SAFETY AT SEA FOR SMALL-SCALE FISHERIES IN DEVELOPING COUNTRIES

Hans Bage, Fishery Industry Officer (Small-scale fisheries), FAO, Rome

This programme targets the following groups of persons:
- fisheries policy-makers and managers in developing countries and in the regional fisheries bodies;
- industry representatives, fishworkers organizations, other stakeholders and relevant non-governmental organizations (NGOs);
- the fishers themselves and their families.

Programme objectives

The long-term development objective of the programme is to improve the livelihood of the populations and in particular that of the small-scale fishing communities.

The short-term objective is to decrease the number of accidents at sea and the effects of such accidents.

Phase 1 of the programme consists of:
- analysis of available information on the cause of accidents;
- field studies;
- a workshop to discuss the results and plan the next steps.

To date, analyses of available information have been undertaken in three main regions:
- West Africa (IDAF Programme);
- Caribbean Islands (TC);
- South Pacific (1991 study).

The West Africa programme will cover the following countries: Cape Verde (island state); Guinea-Bissau (archipelago fishing); and Gambia; Guinea, Mauritania, Senegal and Sierra Leone (open coastlines).

The main causes of small-vessel accidents in West African countries are different depending on the type of coastline. In the island state of Cape Verde, capsizing, grounding and fire on board are the main causes of accidents, while engine failure (44 percent) followed by mist and waves are the main contributing factors. In the archipelago of Guinea-Bissau, fire on the beach is the main cause of accidents, followed by fire on board and injuries with wind and waves being contributing factors. Finally, in the five continental countries (Gambia, Guinea, Mauritania, Senegal and Sierra Leone) with open coastline, conflicts with industrial fishing vessels resulting in collisions, dragging of nets and entangling of gear is the main reason for accidents, while capsizing caused by waves and wind is the main contributing factor.

In the Caribbean Islands, the main causes of accidents at sea include:
- a decline in the standards of vessel maintenance, boat-building techniques and skills;
- small vessels operating too far out at sea;
- lack of enforcement for safety equipment;

- shortcomings in the design, construction and safety equipment of new vessels;
- fishers do not inform the authorities or their close ones where they operate;
- substandard vessels being allowed to go to sea;
- a lack of training in safety and communications.

In the South Pacific, a study including an analysis of the causes of accidents was made in 1991. The main problems included:

- lack of maintenance of outboard engines;
- rough weather with heavy rains leading to swamping of vessels and poor visibility of the small islands;
- certain vessels fish on seamounts, and fishing trips extend for 5–6 days;
- misjudgement by fishers resulting in running out of fuel, changing plans without giving a message, and fishing around fish aggregating devices (FADs) that are located too far offshore;
- anchors dragging, with vessels drifting onto reefs;
- fishing vessels being overwhelmed.

Further field studies have been conducted South Pacific (2003), East Africa (2006) and Latin America (December 2006).

The recommendations from the 2003 field study in the South Pacific included:

- sensitize fisheries managers that sea safety is a legitimate and important objective of fisheries management;
- focus more attention on small-scale fishing vessel safety;
- improve the recording and analysis of sea accident data, and make use of the results;
- improve sea awareness programmes;
- hold a regional sea safety workshop.

The following workshops on sea safety to bring together results of studies and plan the next step have been or will be organized:

- South Pacific expert consultation (February, 2003);
- Comoros workshop (December 2006);
- Latin America (2007).

The programme formulation phase will include:

- elaboration of project proposals;
- agreements for field activities;
- assessment of needs for guidelines, standards, running of workshops, etc.

The programme implementation phase will include:

- project implementation at country/regional level;
- production of guidelines, standards, etc.

The expected output will be specified interventions that will improve safety at sea in small-scale fisheries.

SAFETY AT SEA INITIATIVES FOR ARTISANAL FISHERIES IN GRENADA

Roland Baldeo, Technologist, Fisheries Division, Grenada

Background

The island state of Grenada forms part of the Caribbean Archipelago and it is located approximately 61° 40' W and 12º 30' North (approximately 90 nautical miles [about 170 km) north of the state of Trinidad and Tobago, and directly south of Vincent and the Grenadines). Grenada is volcanic in

origin and mountainous in topography – the main feature being a central mountain range running in a roughly north–south direction.

Grenada has a total land area of 340 km², a coastline extending for 121 km, and the surface are of its exclusive economic zone (EEZ) is 7 700 km². It has a population of 103 000.

The fishery

The main fishing technique is surface longlining for large pelagic species, such as tuna, billfish, kingfish and dolphin fish.

Table A5.1 lists the specifications of the fishing vessels and their operating range.

TABLE A5.1
Fishing vessel specifications and operating range

Longliners (m)	Motor	Number	Construction material	Range (nautical miles)
4–7	25–40 outboard	210	Wood	5–15
5–10	60–85 outboard	175	Wood	10–50
7–9	40–75 outboard	210	Fibreglass	10–50
11–16	130–300 inboard	75	Fibreglass	20–1 000

Note: 1 nautical mile = 1.852 km.

Accidents at sea

Table A5.2 lists the main causes of accidents at sea in the last 25 years.

TABLE A5.2
Causes of accidents at sea, last 25 years

	Percentage	No. of deaths
Engine failure	34	5
Insufficient fuel	12	4
Discharged batteries	12	3
Disorientation	5	4
Collision	8	8
Rough seas	15	15
Unknown	14	11

Fisheries Marine Communication System

The setting up of the Marine Communication System may be the single most important accomplishment by the Fisheries Division in the development of the fishing industry in Grenada in the last 20 years.

In 1995, the Grenada Fisheries Department purchased and installed three VHF marine repeaters on the highest mountains on the islands. These repeaters enabled two-way communication between fishing vessels 100 nautical miles (185 km) out at sea and the land-based VHF transceivers. These have permitted fishermen to exploit fishing grounds farther offshore, knowing that in the event of accidents they can receive assistance from the coastguard. In 2004, a hurricane destroyed most of the communication system but, with financial assistance from FAO, new equipment was purchased and installed. In February 2007, the Marine Communication System network will be functioning normally again and, in addition, a land-based fisheries monitoring station has been set up.

The main functions of the land-based station include:

- To provide a 24-hour listening facility for all vessels in distress.
- To broadcast the marine weather forecast to keep fishing vessels informed.
- To be an accessible communications link between local fishing vessels and the Fisheries Division.

- To broadcast special announcements and bulletins from the Fisheries Division to all local fishing vessels regarding closed seasons, etc.
- To advise all vessels of any known hazards to shipping.
- To facilitate and relay communication when necessary between a distressed vessel and the coastguard in order to facilitate search and rescue operations.
- To facilitate long-range communication between vessels at sea and owners on shore via VHF/SSB phone-patch operation.
- To manually tag fishing vessels' GPS position on a 2 m × 2 m magnetic wall chart and update their position every 6 hours.
- To be the base station for a vessel monitoring system (VMS) centre that will soon be implemented in Grenada.

This new land-based station will not only benefit fishing vessels but also all categories of vessels navigating within and outside Grenada waters.

The equipment (and quantity) installed includes:
- digital selective calling (DSC) VHF radio (1);
- VHF marine radio (1);
- DSC SSB marine radio (1);
- HF amateur radio (1);
- automatic radio direction finder (2);
- Global Positioning System (GPS) (2);
- VHF phone patch (1);
- HF/SSB phone patch (1);
- 500-W VHF linear amplifier (1);
- 100-W HF linear amplifier (1);
- UHF radio (2);
- 50-A power supply (2);
- 16-channel repeater (1);
- 14-channel repeater (1);
- 100-ft (30.5-m) tower (2);
- VHF repeaters (5).

This will enable the station to communicate with vessels up to 100 nautical miles from Grenada and make broadcasts that can be received up to 150 nautical miles from Grenada.

The five repeaters will allow two-way communication with a vessel up to 100 nautical miles out to sea. The station will operate on a 24-hour basis, with four full-time operators.

Safety at sea demonstrations

The Fisheries Division has responsibility for setting up a safety awareness programmes to educate fishers and save lives at sea. Launching an intensive education campaign both in the national media and directly to the fishers has achieved this.

Every three years, the Fisheries Division organizes a "safety at sea month" to create and promote awareness for safety at sea. As part of the safety month, every evening, a public exhibition/demonstration is conducted in all villages throughout the country.

The main features of this public exhibition/demonstration include:
- Tables displaying all the various types of safety equipment are set up in the main street of the town/village.
- In the evening before, a mobile public address system on a vehicle is used to invite the community to the designated area to witness the event.

- A disc jockey is hired to air popular music for the demonstration.
- The parliamentary representative of the targeted area, the Minister of Fisheries, and other VIPs from the town are invited in order to raise the profile of the message.
- Banners and posters promoting safety at sea are displayed in the village during the demonstration.
- Flyers listing the required safety items for fishing vessels are distributed.
- School children from the target area are invited to see and witness the exhibition.
- A fisher who has been in a distress situation before is invited to attend and give a testimony.
- The fisheries officer explains the use of each piece of safety equipment during the demonstration (2–8 p.m.), with a display of all types of flares.
- Radio and television programmes focusing on safety issues are aired.

Training for skippers

The Fisheries Department has instituted a "captaincy training course" for all persons in charge of fishing vessels. The programme is conducted in all major fishing districts with a full week of classroom training.

The topics covered include:

- navigation;
- sailing skills;
- safety at sea;
- distress procedures;
- radio operating procedures;
- navigation rules;
- first aid;
- fire drill;
- troubleshooting inboard diesel engines;
- troubleshooting outboard engines;
- fisheries laws and regulations;
- search and rescue procedures;

As a result of this course, the Fisheries Division has witnessed a decrease in the number of incidents at sea. Participants who pass the course receive a Class II Captain's Permit.

Safety at sea regulations

Recognizing the importance of complying with safety at sea measures, the Fisheries Department enacted a Safety at Sea Regulations in 1990, which made it mandatory for fishing vessels to carry specifically listed safety items. However, enforcement of these regulations only began in 2000.

The regulations apply to all local fishing vessels that fish within a distance of 1 mile of the shore. For open fishing vessels, the mandatory safety equipment to be carried on board includes:

- bailers;
- a compass;
- two gallons (9 litres) of drinking-water for each crew member;
- five gallons (about 23 litres) of reserve fuel;
- a portable flashlight;
- a life jacket for each person on board;
- a hand-held or fixed VHF marine receiver;
- food provisions for 5 days;
- a glass mirror;
- flares (6);
- three oars;
- engine repair tools;
- a portable VMS and a first-aid kit.

In addition to the above equipment, vessels of more than 25 ft (7.5 m) in length with cabin accommodation must be fitted with:

- a fixed-mount VHF marine transceiver capable of transmitting on all international frequencies and DSC compatible;
- two fire extinguishers;
- two bilge pumps;
- full navigation lights;
- a life raft or dinghy capable of carrying all persons on board;
- engine spares, including impellers, fan belt, fuel oil filters and fuses;
- a mooring anchor and rope;
- a radar reflector;
- a spare battery.

Failure to comply with these safety regulations could result in fines and penalties of up to US$2 000. The police, coastguard and fisheries officers are authorized to enforce the regulations.

Fishing vessel inspection programme

All fishing vessels have to pass an annual inspection test to obtain a fishing licence that authorizes them to navigate. Fishing vessels that pass the inspection programmes have a "passed" sticker affixed to them. Fishers whose vessels have passed the inspection programme can benefit from duty-free concessions when importing fishing boats, fishing gear, and navigation and communications equipment, and from rebates on fuel purchased.

The main challenges relating to enforcement of the safety regulations include:

- Fishers complain that safety items are too expensive.
- Safety items are sometimes unavailable on the local market.
- Fishers do not feel obliged to comply, as there is no disincentive for non-compliance.

Conclusions

Overall, the safety at sea regulations have been a success. This can be attributed to the following factors:

- Promotion on radio and television has sensitized fishers and the public about safety at sea.
- Pressure has been put on fishers by their families and friends to be equipped with safety equipment.
- Training programmes on safety at sea by the Fisheries Department.
- Safety equipment has been periodically available from three commercial outlets on the islands at affordable prices.
- The visible "passed" sticker that is fixed to a vessel passing the inspection forces. Captains feel inferior if their vessels do not have the sticker.
- The policy of not providing benefits to fishers unless they pass the safety inspection has been the main underlying factor in promoting compliance with the safety regulations.

Since enforcement of the sea safety regulations five years ago, Grenada has seen a decline in the number of accidents at sea among fishing vessels. This is mainly because fishing vessels are now better equipped with safety equipment, and fishers are more competent in all aspects of boat handling and marine expertise.

SMALL FISHING VESSEL SAFETY AS AN INTEGRATED PART OF SUSTAINABLE COASTAL DEVELOPMENT

Jim Sandkvist, Representative, SSPA Sweden/SIDA

Small fishing vessel safety is an integral part of sustainable coastal development. Accidents from small vessels cause on average 24 000 deaths worldwide and have a severe impact on family and the local economy. The main causes of accidents in small-scale fisheries include:

- fishing too far offshore;
- insufficient fuel capacity;
- engine failure;
- inadequate maintenance of fishing vessels;
- inadequate knowledge of safety equipment;
- lack of safety equipment;
- unfavourable weather conditions;
- lack of accident reporting.

A wide and comprehensive approach to improve safety at sea is expected. Improvement of safety relies on legislation and regulations such as the upcoming FAO stability regulations for small fishing vessels. The following are considered minimum requirements for fishing vessels of less than 10 m in length:

- not sinkable even if overloaded or completely swamped;
- life-saving equipment available depending on the type of climate;
- basic navigational equipment;
- basic communications equipment;
- elementary training on safety at sea.

However, enforcement and inspection capacities must be considered before implementation. Fishery management and fish quality aspects also contribute to improved safety. The artisanal fishing industry makes a significant contribution to the development of the local and national economy, and this industry is the only source of family income in many parts of the world. In order to improve safety at sea and to encourage fishers to adopt safety methods and invest in safety equipment, etc., fishers must be in control of their resources, including ownership, payback possibilities, etc. As a part of coastal fisheries development, the gender issues must be considered. This is in view of the following reasons:

- Women also fish and must be recognized as fishers.
- Women play a role as political actors and can contribute in the organization of safety.
- There is a need for a comprehensive approach as safety at sea is linked to social and economic issues.

Traditional boat designs were developed and refined in view of their original purpose. However, today, they are stretched owing to the introduction of new materials, engines, and other requirements. Traditional boat-building techniques were based on the following factors:

- traditional experience;
- close links between the user and the builder;
- ready access to local markets;
- human skills and local maintenance.

This simple traditional approach to boat-building is changing rapidly as witnessed in India and the United Republic of Tanzania.

From field studies of the design and construction of small fishing boats in the United Republic of Tanzania, the following criteria were recommended:

- Concerning vessel stability, it is important to take into consideration the centre of gravity, the beam of the vessel, and to limit the free surfaces.
- The vessel should be designed with the appropriate material / floating devices in order to improve buoyancy.
- There should be simple *in situ* test procedures – training and testing / awareness.
- Basic knowledge of new building materials such as fibreglass is necessary, i.e. its properties and the maintenance requirements.

In Chennai (India), field studies of small fishing vessel safety indicated that it was important to optimize vessel hull design by taking into consideration the following factors:

- Good loading capacity.
- Effective working platforms.
- Vessels should be designed to be fast and good surfers.
- Vessels should be beached easily.
- It is important that vessels be affordable for the local fishers and be compatible with the local conditions and economy.

After the tsunami that caused substantial loss of life and property, donor agencies supported the reconstruction and modernization of the coastal fleet in India. Initially, there was a massive reconstruction effort, but owing to a lack of quality control, the pre-tsunami vessels were better built and the new vessels now represent a safety risk. For example, although some vessels were manufactured with double hulls, this technique requires watertight construction and professional handling of fibreglass with improved maintenance.

Hence, certain lessons have been learned from these two field studies in India and the United Republic of Tanzania. The introduction of modern materials such as fibreglass increases considerably the possibilities for improving boat size and capacity. However, modern materials also put new demands on safety aspects in terms of design, buoyancy and heavier maintenance schedules.

The efficient formulation and design of weather forecasting services as an early warning system is important, but reaching fishers on the beach with proper information and warnings is not only a matter of broadcasting systems. Organizational matters are of the utmost importance, and successful early warning depends on:

- good indicators, forecasts and alertness;
- good communications;
- increased awareness;
- appropriate technology.

All parts link in the information chain from the national weather service through the local municipality and the local radio station to the local fishers and their families, and they must be connected and in operation. The information must also be relevant and useful. Weather forecasting services and early warning system information function on various time scales depending on natural phenomena development and information transit times. Some of the technologies that can be utilized to transit information for an early warning system include:

- radios, mobile phones, public services, public radio, television;
- Short Message Service (SMS) messages;
- the Internet;
- community centres, churches, minarets, etc.;
- loudspeakers;
- visual methods, such as flags and signals.

Forecasts and warnings should be integrated parts and inputs in emergency and operational plans, which should be on local levels. Improved knowledge and awareness about natural hazards and forecasting possibilities have an impact on long-term planning, capacity building, training and development, all contributing to improving safety at sea for fishers.

Annex 6
Country presentations

PROBLEMS OF SECURITY AT SEA FOR SMALL FISHING VESSELS IN THE COMOROS

Wardi Zahir Aboubacar

Background

Artisanal fisheries in the Comoros have undergone significant changes over the last two decades, marked by the replacement of traditional canoes with outboard engines in the 1970s, and the adoption of new types of fibreglass boats and widespread motorization since the mid-1980s, in parallel with the opening of the fishery school supported by Japanese funding. In addition to this, new types of canoes based on the traditional craft were introduced by JICA (Japan) in 1985 and 1987. With the launch of the Small-scale Fishery Development Project, the artisanal fishery started growing in importance with the introduction of locally manufactured small-size fibreglass reinforced plastic (FRP) launches of between 5.5 and 6.5 m in length, the more widespread use of outboard engines, and the supply of fishing equipment adapted to pelagic species harvesting (tunas). Today, dozens of craft are manufactured every year at three sites in Anjouan and three sites in Grande Comore, all based on designs introduced by the above-mentioned project.

With this modernization, viewed as a positive achievement, fishers had to rely on the availability of spare parts and safety standard requirements because operations were carried out farther offshore. They also had to acquire new knowledge in engine repairs and maintenance as well as new navigation and seamanship skills.

Current situation

Interisland movements are wrongly considered by fishermen as safe, due to the fact that the different islands remain in sight. So, fishermen take excessive risks by moving far away from the shores in search of tuna and bonito shoals, without even the minimum safety equipment on board, and taking their bearings from the summit of the Ntringui in Anjouan and the Karthala in Grande Comore. In rough seas and with limited visibility, craft that lack basic safety equipment (life jackets, flashlights, mirrors, buoys, smoke flares, and navigation aids such as portable compasses and GPS) miss their destinations.

The Comoros are characterized by a warm and humid tropical climate and major meteorological patterns that correspond to high or low pressure zones and air mass variations. Force 7 or 8 winds can blow unexpectedly and last for two to three hours. This situation is almost normal but can pose a hazard for small craft. In these conditions, a launch can drift offshore at a speed of about 8 km/h, and capsize or be carried away by currents in the event of engine breakdown. This has happened several times to fishermen operating offshore who ran out of fuel.

When trolling continuously for several hours far away from the coast, some sensitive parts tend to overheat, increasing the risk of engine breakdown, one of the major causes of loss of fishermen at sea. Some use their experience as fishers to ferry with launches (kwassa kwassa) illegal immigrants to Mayotte, who go there to visit family, receive medical care or look for work. These often overloaded small boats (between 6 and 7.5 m) crewed by inexperienced seafarers also lack safety equipment. The skippers, without basic navigation and mechanical skills, put lives at risk (Table A6.1).

TABLE A6.1
Summary of the situation with Mayotte

Period	Number of boats seized	Expulsions	Recorded deaths (average)
2003	21	5 000	100
2004	31	8 600	120
2005	48	600	105

Source: Mayotte Police.

The most frequently reported cases of distress occur in the coastal areas between Anjouan and Mayotte where waters become quickly shallow. In these fringing reef areas, violent waves can be a dangerous obstacle leading to the capsizing of these overloaded boats.

Some achievements

A number of initiatives have been taken to reduce losses of lives at sea.

The Small-scale Fishery Development Project (EDF) has introduced within its distress flare programme the use of smoke flares and the installation of a positive buoyancy tank in each boat being built.

Under the Economic Recovery Emergency Credit, the Global Maritime Distress Safety System (GMDSS) was established at national level to allow communication between fishers with portable VHF radios and GPS location.

These efforts have proved unsuccessful among fishermen owing to inadequate awareness campaigns, weak purchasing power, and a lack of funding to sustain what had been achieved.

Recommendations

In order to improve navigation and safety conditions of small motorized boats, the Directorate of Fishery Resources in collaboration with the Fishery School are seeking funding to put in place an action plan for strengthening the organizational capacities of the industry and for improving safety at sea.

The proposed action plan takes into account the urgency of the present situation, especially in the field of safety at sea:

- Action 1: Continue craft registration:
  - Establish an inventory of all existing motorized craft in the country and quickly proceed to their registration. This information will form a database that is essential for organizing the sector, and will allow the authorities to identify without delay those fishers in danger.
- Action 2: Outboard engine repair training:
  - Provide relevant engine repair training courses for young fishermen, improving their knowledge of motorized craft.
  - Help young fishermen acquire outboard engine repair skills and carry out maintenance and minor engine repairs.
- Action 3: Navigation and seamanship:
  - Provide fishermen with all the technical support for safe navigation and seamanship.
- Action 4: Safety at sea:
  - Provide intermittent training by qualified trainers in the field of safety at sea (with simulated breakdowns at sea).
  - Offer young fishermen first-aid training courses.
  - Propose to fishermen safety methods likely to improve their livelihoods significantly and lower the fatality rate.
- Action 5: Raise awareness of the maritime code and fisheries regulation:
  - Give information on the maritime code and fisheries regulation.

  - Give fishermen basic knowledge of issues related to the marine environment, and explain to them how it works as well as help them to prevent accidents.
  - Make fishermen aware of the need to provide assistance in emergency situations related to any type of accident at sea.
- Action 6: Repair of fibreglass boats:
  - Provide students with basic knowledge on FRP, its potential and limits in boat construction.
  - Make navigation equipment and aids available to fishermen through purchase and sale centres.

Outcomes

The main expected outcomes of the meeting are:

- monitoring and follow-up of fishery sector activities;
- improvement of fishery sector environment;
- training of fishermen;
- training on and familiarization with safety techniques, navigation and outboard engine mechanics;
- provision of various fishing and safety equipment;
- fishing equipment supply centre;
- monitoring and tracking of boat movements;
- improvement of safety conditions at sea;
- decline in fishermen's mortality rate and illegal trafficking;
- maintenance and repair of outboard engines;
- improved navigation and safety conditions;
- improved living conditions among fishers.

SAFETY AT SEA FOR ARTISANAL FISHERS IN KENYA

Simon Komu

Introduction

The Kenyan Fisheries Department within the Ministry of Livestock and Fisheries Development has the mandate for the exploration, exploitation, utilization, management, development and conservation of fisheries resources. This mandate is described in the Fisheries Act and the Maritime Zone Act of the laws of Kenya.

The vision of government is to have a dynamic fishing industry with the potential to contribute towards food security, employment and the generation of wealth among fishers. The main objective of the Fisheries Department is to facilitate sustainable management and development of the fishery resources and products for socio-economic development in an ecologically viable environment.

The core functions of the Fisheries Department include:

- the management, development and conservation of capture fishery resources;
- the promotion of aquaculture development;
- fish safety and quality assurance;
- the promotion and regulation of fish processing value addition and marketing;
- the promotion of appropriate fishing technology.

Its non-core functions include:

- the promotion of recreational fisheries;
- the facilitation of ice production and cold storage at fish landing sites;
- the promotion of credit facilities to the fishery subsector in cooperation with financial institutions;

- the promotion of affordable and safe fishing vessels and appropriate fishing gear;
- the promotion of appropriate fishing technology.

The main policy objectives/goals of the Fisheries Department include:

- strengthening of the institutional framework and sustainable funding;
- sustainable utilization of fishery resources;
- achievement of efficient and effective fisheries management;
- promotion of sustainable and efficient aquaculture;
- promotion of sustainable and efficient recreational and ornamental fisheries;
- promotion of fish quality and safety, consumption, trade and investment;
- improvement of the fisheries infrastructure and human resource development;
- promotion and coordination of fisheries research;
- enhancement of fisheries information and extension service;
- promotion of regional and international cooperation.

Fish production

Capture fisheries account for the bulk of total production covering freshwater lakes, rivers, dams and marine waters with a total production of 140 000 tonnes. Only 5 percent (7 000 tonnes) of the total fish landings is from marine fisheries, the rest being from freshwater lakes, rivers and dams.

There are approximately 60 000 fishers in Kenya (utilizing 15 000 fishing craft), of whom 90 percent are small-scale artisanal fishers, with the rest being fishers employed in the industrial fishery. The marine sector comprises approximately 9 000 fishers utilizing 2 000 fishing craft.

The main sorts of fishing gear include: gillnets, longlines, traditional traps, and hook and line.

Safety at sea

The major causes of accidents at sea include:

- unstable, non-motorized vessels;
- unpredictable weather, rains and strong ocean winds (in particular during the southeast monsoon);
- lack of lights on small fishing vessels at night;
- poor vessel construction (traditional wooden boats);
- overloading of fishing vessels.

The following government agencies are involved in boat safety programmes:

- the Fisheries Department: boat-building and vessel design, safety at sea legislation, monitoring and surveillance, vessel communication and detection system, fisheries management in relation to sea safety and capacity building;
- the Kenyan Ports Authority;
- the Kenyan Maritime Authority;
- the Kenya Meteorological Department;
- the Kenya Marine and Fisheries Research Institute (KMFRI).

Challenges and constraints

The main challenges and constraints in safety at sea for small-scale fishers in Kenya include:

- low level of funding for enforcement and rescue operations;
- poor training of fisheries officers and fishers in sea safety;
- low level of literacy among fishers;
- lack of purchasing power to acquire safety equipment;
- the need to identify a single lead agency to coordinate safety at sea issues.

In conclusion, a new strategy to address safety at sea for small-scale fishers is necessary in Kenya, taking into account the above challenges and constraints facing the industry.

SAFETY AT SEA SITUATION OF THE TRADITIONAL FISHERY IN MADAGASCAR

Chrysante Jules Randriambololona and Simon Rabearintsoa

Madagascar has 57 600 traditional fishers, mostly using non-motorized pirogues, with annual landings of 70 000 tonnes of fish destined for the local market. In addition, there are 450 artisanal fishers using motorized vessels equipped with engines of less than 50 hp. The traditional canoes are 4–5 m in length overall (LOA) and fish mostly in lagoons inside the reefs up to a distance of 3 km from shore (these inshore waters are currently overexploited).

The main problems with this fishery are:

- Fishers utilize very basic fishing equipment.
- Fishers have no security at sea equipment.
- There is a lack of organization, with more than 65 percent of the fishers being illiterate.
- The fishing villages are completely cut off from the urban centres with no means of communication.

There are several national agencies with the mandate for security at sea, all interrelated with the Ministry of Agriculture, Animal Husbandry and Fisheries, but no single agency with an overall mandate.

The present fisheries legislation is more concerned with the management and development of fisheries resources, and security at sea problems are not considered a priority.

Safety at sea

The main causes of accidents at sea include:

- the vulnerability of the traditional canoes (non-motorized);
- lack of information on meteorological conditions;
- sudden changes in weather patterns;
- fishing too far from traditional fishing grounds;
- lack of security equipment on board vessels;
- disorientation of the fishing vessels.

Certain preventive measures that are taken by traditional fishers include:

- taking members of the crew from different families (on the east coast);
- fishers coming to the assistance of other fishing boats when crossing dangerous reef passes or entering treacherous river basins on returning from fishing trips.

Certain past and ongoing projects have played/are playing an important role in improving security at sea. These are:

- Japanese grant aid projects, which included grants of fibreglass vessels equipped with security equipment.
- The FAO Tèléfood project, which consisted of granting fishing gear and equipment as well as more modern fishing vessels.
- The GTZ/FDHA Project based at the Centre for Training of Fishers at Nosy Be, which involved:
  – training fishers in the use of more selective and modern fishing gear;
  – training fishers in safety at sea.
- The FAO/TCP/MAG/0170 project, which was conceived as a sustainable exploitation project for the lobster fishery. This project consisted of the following elements:
  – training in deep-sea diving;
  – assistance in safety equipment (life jackets).
- Setting up the Centre for Fisheries Surveillance (CSP), which consisted of:
  – coastal surveillance by fast launches;

– aerial surveillance;
– search and rescue operations.

- The Zone d'Aménagement Concerté (ZAC) project to assist the various stakeholders in the management of the shrimp resources and to improve safety at sea.
- The PACP project (a project to assist the fishing community of Toliara), which consisted of:
  – training fishers in the repair and maintenance of outboard motors;
  – improvement in the quality of construction of fishing vessels by introducing fibreglass-built vessels.

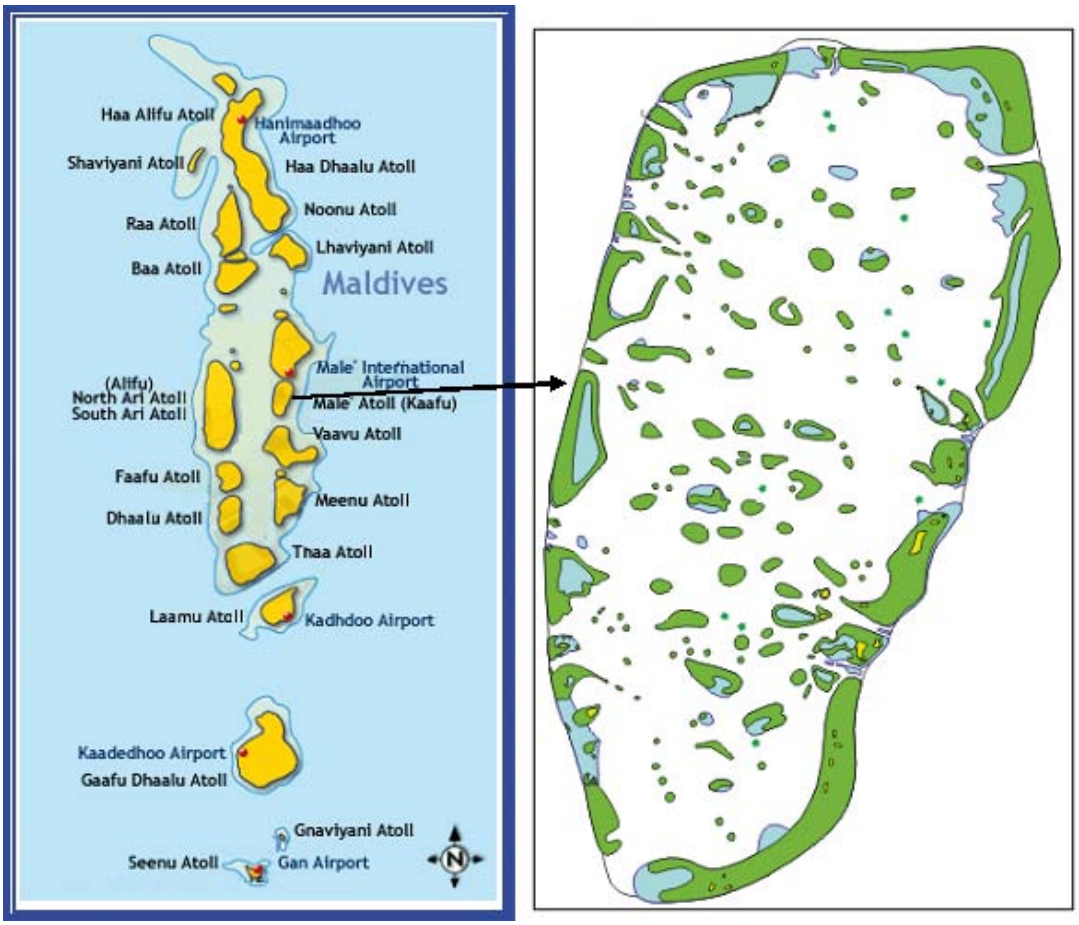
SAFETY AT SEA – MALDIVIAN FISHING VESSELS

Mohamed Shainee, Ahmed Hassan and Abdulla Saeed

Background

The Republic of Maldives is an island nation made up of tiny coral islands, with sea accounting for more than 99 percent of the country's total surface area. The sea and related maritime activities have always played a major role in the lives of the population and, hence, the issue of safety at sea has always been considered extremely important. Maldives is located in the central Indian Ocean. The archipelago consists of about 1 200 tiny coral islands, of which about 200 are currently inhabited. These islands are found in 26 natural atolls, and are grouped into 20 administrative areas (Figure A6.1).

FIGURE A6.1
The Republic of Maldives



Maldives covers an area of 90 000 km^2 and is located about 600 km southwest of Sri Lanka, stretching 820 km from north to south, and 140 km from east to west, with the southernmost islands lying below the equator. The country has an exclusive economic zone (EEZ) of more than 859 000 km^2, and a coastal fishing zone extending from the outer rim of the atolls to about 140 km offshore that is reserved for the exclusive use of Maldivian fishers. This means that no foreign vessel licensed to fish in the Maldivian EEZ can enter this protected zone, while Maldivian fishers have unlimited access to all fishing zones.

Major economic contributors to the country are tourism and fishing, with tourism contributing about 29 percent of gross domestic product (GDP) in 2004. According to the data from Ministry of Planning and National Development (MPND, 2005), the fisheries contribution to GDP was 8.7 percent in 2004. In 2004, 73.48 percent of total exports were from fisheries and fisheries-related products. Based on the census of 2000, about 11 percent of total employment was directly involved in the fishing industry. In fact, each member of the population of about 290 000 (2004) is intimately connected to the fishing industry in view of the fact that their immediate family, either in the past or currently, is intimately involved in the fishing industry.

The most important fishery is the tuna fishery, with the fishing being carried out exclusively by local fishers. Government involvement in the tuna fishing industry has been in the collection and export of fresh tuna and canned tuna products. As the capacity of the private sector has increased recently and, in particular, to promote value addition, the Government has decided to encourage the private sector to increase its participation in the fishing industry. Under the government policy of privatization, the private sector has the opportunity to collect and export fresh and other value-added tuna products. The privatization policy aims to increase the efficiency and profitability of the fishing industry. The second type of fishery is inshore fishing for reef-related species such as giant clam, sea cucumber, grouper, aquarium fish and lobster. This fishery is 100-percent privately owned and carried out in an unsustainable manner as until recently these species were not exploited commercially and, management measures are not adequately developed.

According to data from the MPND (2005), tuna fishing with pole and line accounts for about 87 percent of overall fish landings in the Maldives. It is the oldest economic activity of the country and a major source of food and income for the population. The net fishing technique is prohibited or has not been introduced to the Maldivian fishery. However, the pole and line fishing technique is a very environmentally friendly fishing method. In general terms, tuna fishing operations involve locating surface tuna schools by searching for flocks of seabirds, feeding the tuna with live bait to keep them close to the vessel, and hooking them with pole and line while the fish are in a feeding frenzy.

Women play an important part in the Maldivian fishing industry as in most fishing communities. Women do most of the processing of the fish caught by the men, both in the only tuna canning factory that exists in the Maldives and working as small-scale household processing units. Men and women have a symbiotic relationship in the Maldivian fishing industry.

The Government has been a key player in the development of the fishing industry in Maldives, in particular for the tuna fishery, which until recently was regarded as the only economically viable fishery. The Government has established and facilitated key supporting infrastructure and capital investments such as:

- mechanization of the fishing fleet;
- tuna collection facilities;
- cold storages;
- canning facilities;
- fishing vessels;
- fishery harbour construction;
- fuel distribution.

In addition, the Ministry of Fisheries, Agriculture and Marine Resources (MOFAMR), the government agency mandated with the fisheries-related activities, has undertaken many projects to support the local community in capacity building and, specifically, to increase the involvement and effectiveness of women in the fishing industry.

Sea transportation and fisheries

As outlined above, 99 percent of the total area of Maldives consists of sea. Thus, the number of vessels utilized for travelling by sea is relatively high. A number of Maldivians are linked directly to the growing fishing industry, which provides the major percentage of the animal protein to the population and the basic necessities to a number of rural communities. As a result, fishing vessels (*masdhoni*), represent more than 80 percent of all registered inshore boats. Maldivians have taken huge strides in the manufacture and design of fishing and passenger vessels, in contrast to neighbouring countries.

Sea transportation was the only mode of travel between the islands in the past. Thus, boat-building has always been an important part of ancestral life. In the early days, timber from coconut palms, one of the most difficult boat-building timbers in the world, and other native trees was used to build boats. Boat-building in the past was done without any prior designs. Experienced boat-builders built the vessels to perfect shape and stability characteristics. The cleverness that our ancestral boat-builders showed in building these imaginative boats is a testimony to the talent of the Maldivian boat-building industry. A serious incident has never been recorded regarding the manufacture and design of the boats that were built, which is proof of their boat-building skills.

As already mentioned, Maldives has taken huge steps in the manufacture of boats since the early days. The beginning of the 1980s saw the beginning of a new era in the boat-building industry. Modern boat designs were adopted in the 1980s. These were considerably different from the older versions. The sails and the paddles were replaced by diesel engines, which meant that modifications were made to the double-ended design (Plate A6.1) of the vessels to incorporate a transom (Plate A6.2). Diesel engines were the stepping-stone for the fishing industry of the modern era. The design of new vessels is highly popular among fishers who often use sea transportation. The boat-building and the seafaring industry are developing rapidly.

Plate A6.1
Double-ended Maldivian fishing vessel.

Plate A6.2
A fishing vessel with the transom aft.

Plate A6.3
A fibreglass vessel built after prior design (also illustrating the low freeboard aft).

Progress towards safer fishing vessels

In the 1990s, vessels with diesel engines almost entirely overtook the sail-propelled vessels and, hence, a new generation of fishing vessels dominated the seas of the Maldives. Also during the late 1990s, changes in the materials used in the industry meant that larger boats could be built. The use of fibreglass in boat-building increased vessel size compared with boats build of wood. The new vessel designs adopted new technologies that improved comfort and facilities on board. This also meant that a younger generation with a better academic background entered the fishing sector.

The new fibreglass vessels (Plate A6.3) are built with prior detailed designs and with some structural and design calculations. The new vessels have larger and sometimes insulated fish holds, thus improving the quality of the catch. The vessels still have a large fishing platform aft with a relatively low freeboard, which is an important feature for pole and line fishing. However, the low freeboard of Maldivian vessels is a subject of concern in terms of safety. For vessels built recently, the innovation is that the entire vessel is decked. This is a considerable improvement in terms of crew safety and ease of operation. The earlier open boats posed a threat to the crew, especially in rough sea conditions. Furthermore, the new generation of fibreglass fishing vessels have at least four watertight bulkheads, which are required in terms of damage stability criteria.

It should be noted that Maldivian fishing vessels have a very large beam to depth ratio (about 4–6) and, hence, the initial stability of the vessels is excellent. Studies (Shainee, 2000; MOFAMR/FAO, 2003) have confirmed this statement, demonstrating a good static stability of the vessels. The only criterion that Maldivian fishing vessels fail to satisfy is that of the "Code of Safety of Fishers and Fishing Vessels" of the International Maritime Organization (IMO) regarding stability at large angles of heel. In short, the down-flooding angle is less than that required under the regulations.

Recent developments

As described above, Maldivian vessels are very seaworthy. However, small freeboard, discontinuity in longitudinal beams of the deck due to hatch openings, wide and low hatches, and longitudinal subdivision in the bait well (which holds a large quantity of seawater) are areas of concern in terms of safety of the vessel at sea. Therefore, a recent project designed to replace vessels lost during the tsunami in December 2004 looked into the deficiencies described above, and designed a fishing vessel (Figure A6.2) that would satisfy the international safety regulations. In this respect, the following features were incorporated in the new 85-ft (26-m) fibreglass fishing vessels, which are currently under construction:

- A compromise had to be found in terms of the low freeboard and low down-flooding angle as a low freeboard is absolutely necessary for pole and line fishing and increasing the down-flooding angle is important for the safety of the vessel. Hence, the vessel was designed with a low freeboard (but more than the previous vessels) while decreasing the hatch openings. The engine room compartment and the entrance were raised above the deck with weathertight hatch covers. Similarly, fish hold hatches were coamed, with the hatch cover hinged and fitted with a gasket for watertight integrity. These features enable the vessel to heel without water being taken on by the vessel and, hence, will fulfil the stability requirements at large angles.

FIGURE A6.2
Fibreglass fishing vessel designed to satisfy IMO safety regulations

Plate A6.4
A fibreglass vessel of about 30 m.

- In earlier designed fishing vessels, the bait well had a wide opening for ease of baiting. Moreover, the circulation of the water in the bait tank was established so that water flowed through the hull via openings drilled below the waterline. However, in the new design, the circulation will be provided by way of a pipe system forced by an electric generator. Hence, there will not be any openings below the waterline that can take water onboard by accident or in severe weather conditions, by loosening of the caps. In the new design, the opening of the bait well is smaller (giving a good length between the deck edge and the opening) and raised above the deck to give more space.
- As the bait well has smaller openings, this also enables a continuous beam on the deck, thus improving the structural integrity of the deck.
- All the compartments are fully insulated and subdivided by way of longitudinal and transverse bulkheads, addressing the decrease in stability due to free surface effects.

As fishing vessels account for the majority of the vessels in Maldives, and most of the sea transportation is done either on fishing vessels or on converted fishing vessels, it is hoped that other boat-builders will take up these new design features. This will eventually mean that Maldivian fishing vessels will be safer at sea. In addition to these improved design features, the availability and use of electronic equipment such as mobile phones, GPS, echo sounders and other navigation systems, improves safety at sea. Moreover, all vessels that operate in Maldivian waters have to be registered by the Ministry of Transport and Communication. Regulations also require vessels of more than 18 m in length to carry fire-fighting equipment. Every vessel is also required to carry a life jacket for each person on board and a designated number of life buoys. Bailing systems and first-aid facilities are also a requirement for all registered vessels in the Maldives. If a vessel is more than 18 m, it has to carry a dinghy or life raft onboard. Registered vessels must pass a safety inspection test prior to registration.

Conclusion

Although Maldivian sea-going vessels have a good history in terms of safety at sea, there are no standards for vessel construction in Maldives. The development of the boat-building industry has been based purely on experience and trial and error. It needs to be seen if the design of the vessels satisfies the structural criterion set by international organizations, and also whether the vessels

are overdesigned. If the vessels have been lucky not to have had any serious accidents, Maldivians should consider themselves very fortunate. However, if the vessels are overdesigned, then there could be a major cost reduction. In any case, Maldivians require good boat-building standards in order to enjoy the present record of safety at sea, but they have to be cautious about new ventures in boat-building, such as fibreglass boats of more than 30 m in length (Plate A6.4).

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AN OVERVIEW OF THE CURRENT STATUS OF SAFETY AT SEA IN THE SMALL-SCALE FISHERIES OF MAURITIUS

Neermal Dussooa

Background

The Republic of Mauritius, including the island of Rodrigues, has about 5 000 fishers employed in the fishing industry. Most fishers are involved in the artisanal or small-scale fisheries. They operate in the shallow lagoons as well as outside the lagoon, using pirogues (small, open-hull craft of 5–8 m in length). More than 90 percent of the pirogues are equipped with small outboard motors, and oars and sails are used only in emergency situations.

With the mooring of fish aggregating devices (FADs) in the open sea around Mauritius and Rodrigues, more and more fishers are fishing around these devices. Currently, some 300 fishers are regularly fishing around FADs using pirogues. Moreover, fishing on the distant oceanic banks is also carried out using the same type of craft. With the lagoon and outside-reef areas being heavily exploited, fishing efforts are being increasingly diverted towards these two areas. Inevitably, new safety issues will arise, requiring special attention.

Existing safety arrangements

Measures that have already been implemented concerning fishers' safety at sea can be considered to be very pro-active, namely: prevention; survival and self-rescue; and search and rescue (SAR). The subsections below describe the measures that have been implemented so far.

Institutional organization

The National Coast Guard

The National Coast Guard (NCG) is the maritime branch of the Police Force of Mauritius. It is the main organization dealing with safety at sea issues (enforcement of safety laws, SAR, sensitization, training, and collection and analysis of data on accidents at sea). It is equipped with a large ocean-going patrol boat, several smaller boats and dinghies for rapid intervention, and two light aircraft for airborne SAR. The NCG also has several stations around the coast, which are equipped with search and rescue facilities. They are also present on the islands of Rodrigues, St. Brandon and Agalega.

The Ministry of Agro-Industry and Fisheries

The Fisheries Division is the body within the Ministry of Agro-Industry and Fisheries responsible for the fisheries sector. Different units within the division look after specific issues of the safety of fishers. These units are:

- The Fisheries Protection Service: This unit carries out monitoring, control and surveillance (MCS) duties. Fishery stations situated around the coast of Mauritius and Rodrigues work in close collaboration with the NCG on sensitizing the population and on SAR operations.
- The Fisheries Training and Extension Centre: This unit was created in October 2004, and it caters for the awareness/training needs of fishers.
- The Fishermen Welfare Fund: Founded in 2000 for the welfare of fishers and their families, it also provides financial assistance to fishers and their families in distress.

Other organizations
Several other organizations, both governmental and NGOs collaborate or participate actively in matters related to the safety of fishers at sea. These include the Civil Aviation Department, the Port Authority and Shipping Division, the Tourism Authority, and fishers' associations.

Legal arrangements
The 1998 Fisheries and Marine Resources Act is the legal instrument governing the fisheries sector and the professional activities of fishers. It is also the legal framework for regulations related to the safety and security of fishers. The Ports Act and the Merchant Shipping Act provide for the safety and security of seafarers in general.

In the absence of specific legal provisions regulating the safety and security of fishers at sea, some safety and security measures are included in the fishing licence conditions for certain types of fisheries, e.g. the banks fishery and the chilled fish fishery. Port clearance for mother vessels involved in the banks fishery requires the provision of certain safety equipment (life jacket, VHF radio, hand flares, oars and sails) for fishers fishing from dories.

Awareness and training
Awareness campaigns are run regularly and in different ways. Fishers are sensitized on the issue through seminars, meetings held in their villages, exhibitions and posters. Posters and checklists on safety at sea published by the South Pacific Community have been translated into the local language and distributed widely among fishers.

La Formation itinérante de pêche, a mobile training school, first implemented training in safety at sea for fishers in a formal way in 1985. The Fisheries Division, the NCG, the Sea Training School and NGOs subsequently ran several ad hoc training programmes for fishers dealing with safety at sea. With the opening of the Fisheries Training and Extension Centre, the training of fishers in safety at sea is being carried out more efficiently using the new and improved facilities.

Safety information services
Mauritius is a party to the Safety of Life at Sea (SOLAS) Convention and has the necessary shore-based Global Maritime Distress Safety System (GMDSS) infrastructure. All Mauritian ships are now equipped with GMDSS.

The Mauritius Ports Authority, through its port radio station, communicates all safety information to seafarers. It also intercepts and relays messages during emergency/distress situations. The NCG and Mauritius Telecom are also involved through their respective communications networks and facilities. These organizations are all rescue coordination centres.

The meteorological service, in collaboration with the national television station, national and private radio stations and the Mauritius Ports Authority, provides weather forecasts to fishers and seafarers on a daily basis. A special meteorological bulletin for fishers forecasts the state of the sea both inside and outside the lagoon. The bulletin also includes the height and direction of waves, wind direction and speed, and tidal movements. During cyclone periods, meteorological bulletins are issued several times a day and broadcast in shorter intervals.

Other measures

Bad weather allowance

This is a financial compensation paid to every registered fisher during rough weather periods. It amounts to MUR135 (about US$5) for every day of bad weather that fishers cannot go to sea. The main purpose of this allowance is to compensate for the lack of income. The bad weather allowance also encourages fishers to stay at home and not take unwarranted risks.

Grant of safety equipment

Considering that fishing is a hazardous occupation and that fishers more then any other group require protection, the Government of Mauritius has donated a life jacket and other safety equipment such as hand flares, a radar reflector, a life buoy and an orange-coloured 3 m × 3 m tarpaulin to every registered fisher and boat owner.

Loans and duty concessions

Fishers are entitled to loans on very soft terms from the Development Bank of Mauritius to purchase duty-free safety equipment (spare outboard engine, GPS, magnetic compass, etc.).

Allocation for sickness and interim assistance during distress

The majority of fishers are self-employed and fall into the low-income category. The prolonged sickness of a fisher may be disastrous to the family. In such cases, the Fishermen Welfare Fund gives financial assistance equivalent to 14 days' bad weather allowance. A sum of MUR10 000 (US$300) is also paid to fishers in the event that the boat or engine suffers damage during cyclones, tidal surges and tsunamis. These measures indirectly enhance fishers' safety.

In the event a fisher dies or is lost at sea, a sum of MUR10 000 (US$300) is paid in two instalments to the family as an interim measure. This prevents the family from facing destitution pending payment of insurance and other social aids.

Group insurance for fishers

The Government of Mauritius provides insurance coverage for all registered fishers on an annual basis. In the case of a fisher dying at sea, the beneficiaries are paid a lump sum of MUR200 000 (US$6 000).

Statistical information on accidents and fatalities

The NCG is responsible for the collection and analysis of data related to accidents at sea. Information communicated by the NCG on accidents for the past five years shows the following:

- Number of persons lost at sea: 33.
- Number of persons lost, found and rescued: 397.
- Number of fatalities: 85.

The majority of persons involved in the above cases were fishers.

Causes of accidents

The various causes of the accidents at sea as established by survey teams were as follows:

- defects in boat construction;
- engine/mechanical problems;
- late or no call for assistance;
- inability to provide information to rescue centres concerning vessel position, etc.;
- failure to wear personal safety equipment;
- adverse weather conditions making rescue operations difficult and risky;
- high dependence on alcohol.

Additional/new measures to enhance safety of fishers

Although the number of accidents and fatalities involving fishers does not appear to be on the high side in Mauritius, each accident is still considered one too many. The Government of Mauritius recognizes that safety at sea for fishers is an important and continuing issue that needs to be addressed/mitigated properly. It also recognizes that a holistic approach to fisheries management is needed. Therefore, safety at sea should be an integral part of fisheries management. The safety of fishers should be the concern of all stakeholders. Establishment of a safety culture in the fishing industry is the best way forward. Various measures have already been initiated to meet this objective. The subsections below describe these measures in brief.

Safety regulations

In spite of the various items of safety equipment distributed to fishers free of charge to enhance personal safety, some of them still venture out to sea without it, thus defeating their very purpose. In additional, inquiries conducted into recent cases of accidents resulting in fatalities have revealed that these were caused by negligence as well as defects in boat construction.

Considering that appropriate regulations will act as a deterrent to negligence, the Fisheries Division has already drafted regulations for the safety and security of fishers after consultation with various stakeholders, including fishers' associations. Their proclamation is expected shortly.

Seaworthiness of boats

Pirogues are constructed locally and are not subject to quality control by independent surveyors / naval architects. Poor design and substandard materials can have severe consequences and may only be detected after an accident. Regulations to address these shortcomings are being drafted. They will ensure that fishing boats are constructed to the appropriate standards and are seaworthy.

Fisher registration card

Fishers who are in possession of registration cards benefit from several incentives and facilities provided by the Government. The Government has reviewed the criteria for issuing registration cards to fishers. To obtain the card, a fisher must be less than 50 years old and be medically and physically fit to work at sea. The fisher is also required to follow the general course for fishers (a six-week foundation course, which includes a safety at sea module) run by the Fisheries Training and Extension Centre. This step will ensure that professional fishers are adequately trained and capable of working at sea.

Training of skippers for fishing vessels less than 24 m long

The chilled fish and the semi-industrial longline fishery started some 15 years ago. This fishery is evolving constantly and is likely to undergo rapid development with the promotion of the Sea Food Hub. Most of the skippers employed are untrained as it is not mandatory to employ a qualified skipper for fishing boats of less than 24 m LOA. Yet these skippers have the responsibility for the safety and security of the fishers on board. It is envisaged that an increasing number of untrained and inexperienced skippers will be employed by the fishing industry in order to satisfy the increasing demand. Being aware of this situation, the Fisheries Division has, in collaboration with the Sea Training School, organized a skippers' course for this category of boat. The course will be run after the Shipping Division has carried out the necessary modifications to its statute in order to recognize this category of skipper.

Technologically advanced safety equipment

It is a fact that fishers lost at sea bring a lot of human suffering, distress and destitution to their families. Moreover, SAR operations are very expensive. Information communicated by the NCG shows that it costs MUR215 000 (US$6 450) per 24 hours to run the patrol boat *Vigilant* and MUR16 500 (about US$500) per hour to fly the surveillance aircraft It is thus evident that the more rapidly a victim is rescued, the less human suffering and cost is involved. With this in mind,

studies are underway regarding the practicability and cost-effectiveness of utilizing such novel equipment as mobile phones, GPS, emergency position indicating radio beacons (EPIRBs) in the small-scale fisheries.

SAFETY PROGRAMME BY THE SEYCHELLES FISHING AUTHORITY FOR ARTISANAL FISHING VESSELS IN THE SEYCHELLES

Jude Martin Talma

Introduction

Background

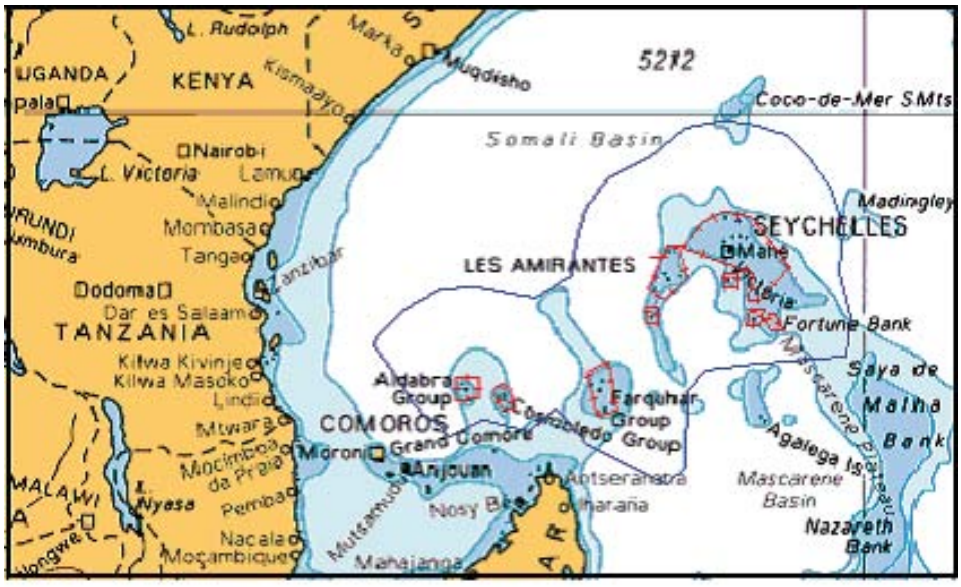
The Republic of Seychelles consists of more than 100 islands scattered over an area of approximately 1.4 million km² in the Western Indian Ocean. The Seychelles Exclusive Economic Zone (EEZ) extends from 0° 23' S to 12° 50' S and from 43° 08' E to 59° 27' E (Figure A6.3).

Fishing activities within the Seychelles EEZ may be broken down into three distinct subsectors:

- The industrial tuna fishery, which is composed of licensed foreign fishing vessels (purse seiners and longliners) from Distant Water Fishing Nations (DWFNs) that target the abundant tuna resources found within and outside the Seychelles EEZ.
- The semi-industrial fishery consisting of locally owned longliners, with vessels lengths ranging from 14 to 22 m, that target mainly tuna and billfish.
- Artisanal fishing carried out by local fishers that target mostly demersal species, which are strictly reserved for Seychelles nationals.

Since the first national policy document on fisheries was drafted in the mid-1980s, safety at sea has always been considered an important issue. The national fisheries policy states that the Government of the Seychelles will assist local boat owners in acquiring safety equipment at affordable prices and will intensify its efforts to educate fishermen and boat owners on the importance of safety at sea. In order to attain this objective, the policy states that government will facilitate the provision of the necessary navigational and safety equipment.

FIGURE A6.3
The Seychelles EEZ



Moreover, the new National Fisheries Development Strategy for 2006–2011 makes provisions for a programme of safety at sea for future fisheries development.

Role of the Seychelles Fishing Authority concerning safety at sea

The role of the Seychelles Fishing Authority (SFA) concerning safety at sea is to:

- advise and provide information on different safety equipment to be carried according to the size of fishing boats;
- advise on the safe and efficient design and construction of boats including engines (especially battery-charging system) as the first step to ensuring safety at sea;
- advise on the importance of preventive maintenance of boats, engine and equipment (e.g. service schedule, check-ups).

The SFA is also responsible for installing emergency position indicating radio beacons (EPIRB) and vessel monitoring system (VMS) transceivers on local fishing vessels.

The SFA Fisheries Monitoring Centre (FMC) receives VMS position data and disseminates this information to the Maritime Rescue and Coordination Centre (MRCC) at the coastguard for search and rescue operations.

Types of vessels

There are currently more than 200 small-scale fishing vessels (Table A6.2) with inboard engines and autonomous power supply (6–24 m) that fish farther than 60 nautical miles (109 km) from the main island (Mahé) of Seychelles. These vessels were originally targeted for the installation of safety devices.

TABLE A6.2
Main vessel characteristics

Type	Length (m)	Engine	Typical fishing range/distance (miles)	Deck type	Material	Crew	Trip duration	Equipment (navigational communication)
Whaler	6–12	2–3 cylinder (26–44 hp)	Up to edge of plateau, 70–120	Open for day-trips, some semi-covered	Wooden or fibreglass	6–8	Open deck 1 d, semi-covered 6–8 d	AM radio, VHF, GPS, VMS
Lekonomi	6–8	1–2 cylinder (13–26 hp)	40–70	Semi-deck	Fibreglass	2–3	3–4 d	GPS, echo sounder, AM radio, VMS
L'avenir	9–10	3 cylinder (36 hp)	70–120	Decked	Fibreglass	3–4	6–8 d	GPS, compass, echo sounder, VMS
Schooner	10–15	3–4 cylinder (~55 hp)	70–150	Decked	Fibreglass (some wooden)	6–7	8 d	VHS, GPS compass, VMS
Longliner	16–24		> 120	Decked	Fibreglass	10–20	1 w to 1 m	GPS, compass, echo sounder, VMS
Open boat	5–7	25–40 hp	3–25 (inshore)	Open	Fibreglass	2–3	Day trips	None
Pirogue	4–8	None	1–2	Open	Wooden	1–2	2–5 h	None

Emergency position indicating radio beacons

In 1995, the SFA was granted twenty 121.5-MHz emergency position indicating radio beacons (EPIRBs) for the artisanal fishing fleet to improve security at sea. All units were installed on larger vessels, and a homing device (direction finder) was installed on the Caravan aeroplane that flies regularly to all outer islands of the Seychelles.

The system experienced several constraints, although it did serve its purpose of improving safety at sea for certain fishers. The main problems encountered were: discharged batteries and their replacement; and activation of the system when not in real distress. Moreover, as of 2009, the 121.5–MHz frequency is being phased out internationally.

At the June 2000 meeting of the 23rd Session of the COSPAS-SARSAT Programme Agreement (attended by 32 nations), a consensus was reached to terminate the processing of 121.5/243-MHz satellite alerts by 1 February 2009. The meeting concluded that the Russians would stop including 121.5/243-MHz repeaters in their satellites starting in 2006. In 2003, the sale and manufacture of 121.5-MHz EPIRBs became illegal, and in 2006 it became illegal to operate these beacons.

In light of the above, the COSPAS-SARSAT Programme announced that in 2009 that it would terminate satellite processing of distress signals from 121.5-MHz and 243-MHz emergency beacons. Although the use of emergency beacons activating on these frequencies does not fall under the responsibility of the COSPAS-SARSAT Programme, mariners will have to switch to emergency beacons operating at 406 MHz in order to be detected by satellites.

In Seychelles, the Department of Information, Technology and Communication has announced that the 121.5-MHz EPIRB is no longer licensed, owing to its phasing out process, and recommended that anyone planning to buy a new distress beacon should be aware of the current problem and take the COSPAS-SARSAT decision into account. Therefore, the SFA has started to remove the 121.5-MHz EPIRBs that were on board the 20 vessels and replace them with VMS transceivers.

The SFA has in its possession thirty 406 EPIRBs, which it intends to install on 30 fishing vessels. However, with the VMS project still in its implementation phase, a decision has yet to be taken on the on the type of vessels to which the EPIRBs will be allocated.

Vessel monitoring system

A vessel monitoring system (VMS) was introduced in Seychelles in December 2001, when the system was commissioned, and it became fully operational in March 2002. The technology enables vessel location information to be transmitted from a vessel automatic location communicator (ALC) or transponder to the FMC via a satellite network. Reports are transmitted electronically by e-mail, as per the VMS protocol.

In line with government policy to improve the safety at sea of local fishers, the SFA has, since July 2003, embarked on a VMS project for the local artisanal fishing fleet. To date, 110 local small-scale fishing vessels have been fitted with VMS transceivers. A further 140 vessels have been earmarked for this project. As VMS for local fishing vessels is not legislated or on condition of a licence, vessel owners voluntarily participate in the project with a signed agreement between the SFA and the owners.

Pending the review of the Fisheries Act in 2007, the VMS regulations will be legislated and, hence, vessel owners who were reluctant to join the project will have to comply with the new regulations.

In 2003, the first phase of the project was initiated using the TT3022D model. Fifty units were installed on different types of vessels ranging from the semi-decked 6.2-m fibreglass vessels to 22-m decked longliners. It was found that the TT3022D model was more suited to the larger vessels and was too exposed to severe weather conditions in smaller vessels.

In 2005, the SFA worked closely with its supplier of Inmarsat-C transceivers, Satellite Airtime and Thrane & Thrane, to produce a new version of Inmarsat-C transceivers (TT3026D) that will meet the requirements for local fishing vessels. The new Inmarsat-C mobile accommodates both a distress and breakdown alert function. The distress alert is routed via the GMDSS, whereas the breakdown alert is routed via the Inmarsat satellite directly to the SFA, whereby the alert will be picked up by the software developed for this purpose. The alert will generate a pop-up window indicating the vessel and location details plus sound alert and Short Message Service (SMS) messages to a dedicated mobile phone number.

With the introduction of the local VMS project, the SFA in collaboration with the Seychelles Coastguard and other vessel owners have responded to 30 cases of distress or breakdown alerts, many of which could have resulted in loss of lives and fishing vessels.

The local VMS project is proving to be a success not only with the number of distress and breakdown alerts produced but also in terms of cost-effectiveness for SAR because of the accurate location data generated, hence reducing aerial search and patrol time.

In the event of distress or breakdown alert, the FMC is responsible for receiving the VMS data and communicating these data to the Seychelles Coastguard.

The Seychelles Coastguard

The Seychelles Coastguard is responsible for all SAR and the surveillance of the EEZ for fisheries purposes. The coastguard has a fleet of ten vessels, including a patrol vessel of 46 m, two vessels of 20–23 m, and six patrol craft of 15 m. They have a patrol aircraft, which is operated by the Islands Development Company (IDC), and depending on the range of patrol, other IDC aircraft are hired for patrol and SAR operations.

The coastguard has an MRCC, which functions on a 24-hour basis. In the event of SAR and sea patrol operations, VMS data from the FMC is forwarded to the MRCC in order to facilitate the operation.

The radio watch for SAR at sea is also assured by a coast station operated by the local telecommunication company, Cable and Wireless. Fishing vessels in distress or requiring assistance at sea that are equipped with VHF or HF radios can communicate directly with the coast station, which re-transmits their calls either to the SFA or to the coastguard.

The MRCC can also receive distress alerts that are routed via the GMDSS.

Search and rescue operations

Search and rescue operation processes depend on three main factors. These are

- When a fishing vessel with no communications equipment on board goes missing, after its being one or two days late in its scheduled return date to port, aerial and maritime SAR patrols are organized.
- When the vessel is equipped with a radio only, the skipper calls the Seychelles Coastguard via the coast station. Through the VMS centre, the SFA locates other vessels in the area of the vessel in distress that may provide assistance. This information is forwarded to the Seychelles Coastguard, which then decides the best approach to the operation.
- When a vessel with VMS is in distress or a breakdown situation, the skipper has the option to alert the Seychelles Coastguard or the SFA depending on the nature of the problem. The SFA and Seychelles Coastguard liaise as per the procedure described above in order to assist the vessel concerned.

Future development

In 2007, the SFA intends to start the process of reviewing the Fisheries Act, whereby VMS will be included. Other future developments may be:

- the acquisition of a specialized aeroplane for fishery surveillance purposes;
- a project to install VMSs on artisanal fishing vessels without power supply.

SAFETY AT SEA FOR SMALL-SCALE FISHERIES IN THE UNITED REPUBLIC OF TANZANIA

Yason Mndeme and Shomari Haji Haji

Introduction

The United Republic of Tanzania has a surface area of 945 087 km^2. The aquatic zone accessible to small-scale fishers is less than 122 000 km^2, of which 64 000 km^2 is the territorial sea and 58 000 km^2 is freshwater. The exclusive economic zone (EEZ) covers 223 000 km^2. The coastline in the United Republic of Tanzania is about 1 424 km, extending from the border with Kenya in the north to Mozambique in the south. A large part of the coastline is used for fishing community settlements and urban developments.

Fisheries in the United Republic of Tanzania contribute about 3 percent of the national gross domestic product (GDP) and about 13 percent of foreign currency earnings. The number of permanent fishers in the United Republic of Tanzania stands at 144 755, of which 29 754 fish marine waters (2005 Frame Survey data). For the majority of small-scale fishers, fishing is the main source of employment, and fish and marine products represent the main source of animal protein and family income.

The potential yield in Tanzanian marine waters (territorial waters) is estimated at 100 000 tonnes of fish annually, excluding production from the EEZ. The current annual fish production in the United Republic of Tanzania is 375 534.6 tonnes, of which 54 968 tonnes is from marine waters. Artisanal fishers in the United Republic of Tanzania produce about 90 percent of the total annual fish catch. Thus, one can readily understand the important role of small-scale fishers in the Tanzanian economy as well as their contribution to the supply of animal protein.

Fish production in Tanzanian marine waters

The Tanzanian marine fishery can be subdivided into three main categories:

- the artisanal fisheries;
- the semi-industrial fishery;
- the industrial fishery.

The artisanal fisheries

Local fishers using small craft of up to 10 m LOA carry out this type of fishing. Such vessels include dugout canoes, planked canoes, outrigger canoes, and dhows. Most of these craft are non-motorized and built of wood. Most of the local craft are propelled either by sails or paddles. Because of the nature of the craft utilized, fishing is carried out in shallow waters, targeting reef, demersal and semi-pelagic fish species. As a result of continuous year-round inshore exploitation, together with increases in the number of fishers and, hence, the fishing effort, the resources are overexploited in these areas. There is a need for the local fishers to fish farther offshore in order to improve their catch.

TABLE A6.3
Fish catch trend in Tanzanian marine waters (artisanal fishery)

Year	Catch (tonnes)
2001	52 934.9
2002	49 674.5
2003	49 270.0
2004	50 470.0
2005	54 968.6

TABLE A6.4
Trend in the number of fishers and vessels, 1995–2005

Year	No. of fishers	No. of vessels
1995	13 822	3 768
1998	20 625	5 157
2001	19 071	4 927
2005	29 754	7 190

The main types of fishing gear used include traps, gill nets, shark nets, scoop nets, hand lines, longlines, ring nets, and cast nets. This type of fishing, carried out using locally built craft, accounts for about 90 percent of total annual marine fish landings in United Republic of Tanzania. A fish frame survey conducted in 2005 revealed an increase in the number of vessels as well as fishers. Fish landings are also reported to have increased gradually since 2003 (Tables A6.3 and A6.4).

The semi-industrial fishery

This fishery is composed of larger and more sophisticated locally owned vessels with lengths ranging from 11 m to 24 m. These vessels operate in the territorial sea and in inshore waters. Most of these vessels are involved in the commercial prawn fishery and other pelagic fish species, and the fishing fleet is composed mostly of trawlers, purse seiners and longliners. The contribution of this fishery to the national economy is very significant as most of the fishing companies sell their catch on the export market. Currently, about 12 prawn trawlers are involved in the prawn fishery, with an additional two small trawlers occasionally targeting prawn resources. In 2004, the number of large prawn trawlers operating in Tanzanian coastal waters totalled 25, including 2 medium-sized trawlers, while in 2005 the number of prawn trawlers had decreased to 15, including 4 medium-sized vessels (Table A6.5). This decrease in the number of vessels involved in the prawn resources could have been caused by a decrease in prawn stocks brought about by changing weather patterns (drought) or by an increase in fishing pressure (effort) resulting in poor stock recruitment.

TABLE A6.5
Trend in prawn fishing effort

Year	Number of vessels
2000	25
2001	19
2002	23
2003	25
2004	27
2005	19
2006	12

Prawn fishing grounds are divided into three main zones: Northern (Zone 1); Central (Zone 2); and Southern (Zone 3). Fishing by prawn trawlers is authorized during day-time hours. No fishing is permitted at night, when vessels have to anchor. Fishing by large trawlers lasts for one month, after which the vessels have to return to harbour to land their catch before proceeding to another fishing zone. Marine fisheries observers are normally dispatched to selected vessels in order to monitor fishing operations and report to the fisheries authorities.

The industrial fishery

This fishery is dominated by foreign-owned purse seiners and longliners targeting tuna and tuna-like species. The vessels are mainly from the European Union and Japan. In 2006, a total of 85 vessels (47 longliners and 38 purse seiners) were licensed to fish in the EEZ (Table A6.6). Of these, six longliners were Tanzanian-owned. The figures for catches from the Tanzanian EEZ are unknown as foreign vessels (tuna fishing) do not export from the United Republic of Tanzania and are reluctant to provide data.

TABLE A6.6
Vessels licensed to fish in the Tanzanian EEZ

Year	Longliners	Purse seiners	Trawlers	Total
2002	10	-	-	10
2003	18	26	-	44
2004	40	41	4	85
2005	43	36	-	79
2006	47*	38	-	85*

Note: * Six of the longliners are local fleet.

Legislation

The fisheries policy guides the fisheries sector in the United Republic of Tanzania. The policy is implemented through Fisheries Act No. 22 of 2003 and the Fisheries Regulations of 2005. Other relevant acts are:

- Territorial Sea and Exclusive Economic Act No. 3 of 1989 (Cap. 238);
- Deep Sea Fishing Authority Act No. 3 of 1998 (Cap. 388);
- Marine Parks and Reserves Act No. 29 of 1994.

The Fisheries Act includes various fishing activities, including fisheries development, fisheries management, exploitation and utilization of fisheries resources, aquaculture development, and conservation of fisheries resources. In the protected areas, the Marine Parks and Reserves Act is used as a tool to manage and conserve various species. Marine protected areas have restricted access as well as restrictions on the types of gear utilized. Currently, the United Republic of Tanzania has two marine parks, namely, Mafia Island Marine Park and Mnazi Bay and Ruvuma Estuary Marine Park, and several protected areas.

The Deep Sea Fishing Authority Act No. 3 of 1998 had the objective of establishing an institution called the Deep Sea Fishing Authority for undertaking all matters concerning exploitation of resources within the EEZ. The functions of the authority were to be:

- to promote, regulate and control fishing in the EEZ;
- to regulate the licensing of persons and ships fishing in the EEZ;
- to initiate, implement and ascertain the enforcement of policies and control of deep-sea fishing vessels;
- to formulate fisheries policies;
- to negotiate and enter into any fishing or other contract, agreement or any kind of fishing cooperation with any government, international organization or other institution in pursuance of the provisions of the act.

The authority was to be made up of the following organs: the Executive Committee, the Advisory Committee, and the Management Committee. However, this important authority that had been designated for the management of marine resources in the EEZ has not yet been established. However, there is an ongoing process to establish it in order to develop the industrial fishery and improve the Tanzanian economy.

Safety status for small-scale fisheries

Institutions and agencies involved in implementing safety regulations

Ministries and agencies responsible for safety at sea

Two government ministries are directly involved in implementing sea safety laws and regulations. They are the Ministry of Infrastructure Development and the Ministry of Natural Resources and Tourism. Two departments in these ministries are responsible for the enforcement of acts and regulations regarding safety at sea. The two departments are Communication and Transport in the Ministry of Infrastructure Development, and Fisheries in the Ministry of Natural Resources and Tourism. In the Ministry of Infrastructure Development, the agency responsible for safety at sea is the Surface and Marine Transport Regulatory Authority (SUMATRA). SUMATRA is carrying out its objectives through the implementation of the Merchant Shipping Act No. 3 of 2003 and the Merchant Shipping Regulations of 2005. This agency deals with vessel registration, licensing, and certification of marine officers. Other agencies dealing with safety issues are the Tanzania Harbours Authority (THA) and the Tanzania Meteorological Agency (TMA). The TMA plays a key role as it provides information on weather forecasting, which can inform fishers on the weather expected at sea. It acts as an early warning system in that fishers can decide whether to go to sea depending on the prevailing weather patterns.

In addition, training institutions are very important for the exchange of information that is essential to the fishing industry. Two training institutions are currently involved in training personnel needed in the fishery industry. The Mbegani Fisheries Development Centre (FDC) offers in-depth courses in navigation and gear technology as well as short courses in fire-fighting, life-saving (survival at sea), first aid, and other related courses. The FDC also offers training in boat-building and boat design, and builds wooden boats of up to 14 m. It is also involved in improving local craft (ngalawa or outrigger canoes) in order to increase stability and strength. The objective of improving local craft is to improve the safety of the fishing vessels so that fishers can reach offshore fishing grounds. Although fishers are encouraged by the strength and stability of the improved crafts, the main constraints in using the craft are its high price, which most local fishers with their low purchasing power cannot afford.

Another institution offering training on safety at sea is the Dar es Salaam Maritime Institute (DMI). Like the FDC, the DMI offers both short and long courses that are important in ensuring safety at sea for the fishers and other passengers. The DMI specializes in the training of skippers who sail larger vessels such as cargo vessels, industrial fishing boats or passenger vessels.

Boatyards
In addition to the boatyard at Mbegani FDC, the Government owns three other boatyards located in various regions of the country. The three sites are Mwanza South Boatyard (in the north), Kigoma Boatyard (in the west) and Mikindani Boatyard (in the south). Owing to the wood shortage currently facing the United Republic of Tanzania, the manufacture of wooden boats will gradually have to cease. Fishers will have to shift to other types of material for building fishing boats. However, the question is whether fishers will be able to afford these new types of boats.

Two privately owned boatyards also operate in the United Republic of Tanzania, one constructing steel boats and the other fibreglass boats. The latter boatyard is currently not operational owing to the lack of potential markets for the boats. The prices for the boats were very high and beyond the reach of most fishers and other boat users. However, the fact remains that boats constructed by a qualified builder are safer and more comfortable than those produced by local boat-builders who do not have proper designing and boat-building skills.

Safety status for sea-going vessels
The fishers themselves, as well as the district authorities where they are registered and licensed, do not observe safety procedures for the majority of local craft. Section 11(1) of the Fisheries Regulations 2005 stipulates clearly that no fishing vessel licensed shall proceed on a fishing voyage without having fulfilled certain obligations, including a minimum number of safety appliances. Their obligations include having sufficient containers of water, food and utensils to hold water and food. Other recommended safety equipment includes a serviceable horn or trumpet, at least two life rings, one life jacket for each crew member, and one inflated vehicle tube.

For the semi-industrial fishery, safety at sea is not a major problem as vessel owners are wealthier and can install the necessary equipment and safety appliances, and there is proper enforcement of regulations. This is due to the fact that, before a vessel is registered, it should be surveyed and inspected. One of the prerequisites for being registered or obtaining a fishing licence is to have a seaworthiness certificate and the required safety equipment and appliances on board the vessels.

Prawn fishing vessels are inspected monthly to confirm compliance in respect to safety equipment and the type of gear permitted. Because inspections are frequently carried out, should there be any distress at sea, the vessels can easily communicate with the nearest signal station, from where the message will be sent to all nearby vessels for search and rescue operations.

Concerning the issue of safety at sea, artisanal fishers face a serious problem as they use very small craft that are non-motorized. Indeed, out of 7 190 vessels fishing found along the Tanzanian coastline in 2005, only 564 were motorized (7.8 percent). Of the remainder, 3 715 were dugout canoes (about 52 percent), which is a good indication of the risks facing artisanal fishers.

Most of the local craft use paddles or sails as a means of propulsion, thus making them vulnerable to accidents, especially during the strong winds of the southeast monsoon. The vessels are not fitted with navigational equipment or radio communication systems, which in cases of emergency makes communication with a nearby signal station impossible. Most of the artisanal fishers do not carry provisions such as food and enough drinking-water. There are no first-aid kits in most of these craft, which make it difficult for fishers to receive first aid in the event of an injury. Therefore, safety at sea is a very serious issue for the artisanal fishers.

Despite the importance of taking safety precautions for all fishing vessels going out to sea, artisanal fishers generally do not comply with the regulations. The main reasons why artisanal fishers do not comply with safety standards include:

- Poverty:
  – Most artisanal fishers are poor and cannot afford to buying safety equipment.

  - The craft used are too small to carry the necessary provisions.
  - Artisanal fishers are unable to buy sturdier and safer boats (e.g. fibreglass boats) or improved craft because of their high price.
  - Fishers cannot afford to purchase television sets and radios in order to listen to the weather forecast.
  - Artisanal fishers cannot afford to purchase communications equipment.
- Inspection: Authorities should inspect fishing vessels going out to sea in order to monitor compliance. However, there is negligence in enforcing these safety regulations.
- Poor record keeping:
  - No records are kept of fishers who ignore safety regulations and, hence, no penalties are imposed for repeating the same mistakes.
  - No records are kept of the number of fishers going fishing every day and the number returning (in order to identify anyone missing). This is because of a lack of government to enforce regulations and keep records on all major incidents occurring in the fishing industry.
- Ignorance:
  - Most fishers lack awareness of the requirements for safety at sea and their importance.
  - Fishers work from past experience, being unaware that there are now drastic changes in the seasons.
  - Most fishers are reluctant to learn and adopt new techniques.
- There is no reporting by fishers to the authorities of accidents at sea, especially where they involve only a few fishers.

Proposed measures for improving safety at sea
Measures proposed in order to improve safety at sea are:

- Sensitize fishers on safety at sea.
- Authorities dealing with safety at sea at different levels should monitor compliance by all craft regularly (districts, ministries and agencies) in order to ensure at least minimal compliance.
- Law enforcement should be strengthened.
- Subsidize prices of safety appliances in order to make them available to all fishers.
- Facilitate access to credit for artisanal fishers in order:
  - convince fishers to create fishing cooperatives in order to have access to loans;
  - procure sturdier and durable boats;
  - purchase safety equipment.
- Ensure availability of safety equipment/appliances at affordable prices:
  - by encouraging the import of safety equipment;
  - by waiving import taxes on safety appliances.
- Ensure availability of quality boats/craft:
  - subsidize prices for fibreglass fishing boats;
  - waive import taxes on imported fibreglass fishing boats and raw materials for the manufacture of fibreglass boats.

SAFETY AT SEA IN SMALL-SCALE FISHERIES IN THE REPUBLIC OF YEMEN

Jamal Ahmed Rajaa and Abdul Salam Hussein Aldulaei

Introduction

The Republic of Yemen is located on the Arabian Peninsula in southwest Asia. The country consists of the former North Yemen and South Yemen. It borders the Arabian Sea and the Gulf of Aden in the south, the Red Sea in the west, Oman to the northeast, and the rest of the country borders Saudi Arabia. Its territory includes the remote island of Socotra, about 350 km to the south, off the coast of East Africa.

Yemen has a total land area of 527 968 km² and a population of approximately 21 million, giving it a population density of 40 persons/km².

Fisheries management and sea safety in Yemen

The Yemeni fishing sector can be classified by type of fishing activity into two main sectors:

- The traditional fishing sector, which can be subdivided into two subsectors: (i) fishers belonging to cooperatives; and (ii) fishers fishing individually. The fishing zone for this sector extends up to 5 nautical miles (9.25 km) from shore.
- The industrial fishing sector, which can be divided with two subsectors: (i) coastal fishing; and (ii) foreign fishing. The coastal fishing zone extends between 5 and 125 nautical miles, while the industrial sector is located from 125 nautical miles up to the edge of the Yemeni exclusive economic zone (EEZ).

Small-scale fishers in Yemen

There are approximately 50 000 small-scale fishers in Yemen, most being members of cooperatives (Table A6.7). There are 116 cooperatives that provide several services to fishers such as marketing of their catch and the provision of ice, etc.

TABLE A6.7
Fishing cooperatives

Small-scale fishers	Approximate percentage
Fishers belonging to cooperatives	70
Individual fishers (not belonging to cooperatives)	30

There are 15 000–20 000 small-scale fishing vessels in Yemen, most built of fibreglass (these are slowly replacing all wooden vessels). These fishing boats can be classified in three categories according to their length (Table A6.8).

TABLE A6.8
Fishing boats, by category

Fishing boat length (m)	Approximate percentage
3–7	80
8–15	15
16 and longer	5

Recommendations for improving safety at sea for small-scale fishing vessels

The recommendations for improving safety at sea for small-scale fishing vessels in Yemen are:

- Implement and enforce the current legislation concerning safety at sea for the traditional fishery.
- Revise and update the legislation concerning safety at sea.
- Raise the awareness of small-scale fishers on the importance of training in safety at sea through workshops and extension programmes.
- Produce more guidelines, posters, brochures, etc. to underscore the importance of safety at sea for small-scale fishers.
- Ensure that life-saving equipment is available on the local markets at a reasonable (subsidized) price.
- Establish meteorological stations along the Yemeni coast to provide accurate weather forecasts.
- Establish several fishing vessels and engine maintenance workshops along the Yemeni coastline.

Annex 7
Conclusions of the working groups

GROUP 1 – FISHING OPERATIONS

1. Preparations before fishing

a) Verification of material:

- tool kit,
- anchor with rope,
- radio/GPS/mobile phone/compass,
- first-aid kit,
- tide table,
- paddles/sail,
- spare parts (including spark plugs),
- fuel (amount and quality),
- food and water,
- bilge system (pump, bucket, etc.),
- fire-fighting equipment,
- life jackets,
- safety kit,
- map.

The responsibility for verification lies with the boat captain. The responsibility for the supply of material lies with the boat owner.

b) Other verifications:

- weather,
- boat well maintained,
- notification (travel plan),
- adequate crew.

These are responsibility of the boat captain.

c) Training:

Training for captains:

- navigation skills,
- map interpretation,
- operation of communications devices (VHF, GPS, mobile phone, compass, etc.),
- weather interpretation,
- boat design and stability,
- first aid,
- fire-fighting skills,
- engine operation and repair (also for mechanics if available).

The captain should have a certificate of competence for the category of boat.

Training for crew:

- gear technology,
- sea survival techniques,
- fishing technique.

Government officers should have training in record keeping and registration.

d) Availability of material:
- preferably locally available,
- government subsidies,
- credit facilities.

2. During fishing
- boat limitations, distance/weather,
- amount of fuel, water,
- boat capacity/load,
- communication,
- watch keeping / remaining alert.

3. Phases of a fishing trip
- going to the fishing ground,
- fishing,
- returning to landing site,
- at the landing site.

All countries are not equal – they should be assisted as per their current situation and then brought up to international standard.

GROUP 2 – DATA COLLECTION

1. General:
- It is vitally important to have information/data on safety at sea.
- Very few countries have this information or are collecting it in a methodological way.
- It is important to have the structure within the fisheries department for monitoring; there is a need for trained persons.
- Some countries, e.g. Mauritius, already have a system in place, but it may need enhancement.
- Kenya: Beach Management Units, together with syndicates and associations report directly to the Fisheries Department.
- Comoros: Police with special duties and radio communication report directly to the Fisheries Department.
- There should not be any intermediaries in this reporting.
- It is important to have a designated agency responsible for collecting and maintaining data.
- Today, there are too many agencies involved, and no agency is clearly responsible for collect and exchanging information.

2. Information requirements and methodology:
- Data/information to fishers – operational:
  – meteorology,
  – radio announcements,
  – sensitization.
- Data/information from fishers – for monitoring:
  – case history of accidents,
  – causes of accidents (capsize, collision, etc.),
  – analyses.
- Other data/information:
  – sizes of boats,
  – registered/licensed,
  – safety equipment on board,

– monitoring or record of maintenance of boats,
– annual inspection.

3. Training

GROUP 3 – LEGAL FRAMEWORK

1. General:

- lack of political will;
- lack of recognition of fisheries sector at the national level;
- inadequate recognition of safety of fishers on a par with recognition of the need to protect marine resources and habitats.

2. Coherence:

- too many agencies in charge of sea safety with no clear mandate;
- absence of a coherent framework for fisheries development/management, quality control, sea safety, etc.

3. Legislation and policy:

- poor legislation in relation to safety at sea.

4. Implementation:

- insufficient implementation of existing legal measures for sea safety;
- lack of capacity to implement sea safety measures (e.g. lack of personnel);
- lack of compliance with existing sea safety measures;
- inadequate attention to preventive measures (considering the absence of capacity to invest in coastguard, etc.);
- inadequate recognition of variations across regions and fisheries.

5. Awareness:

- lack of general awareness on sea safety issues.

6. Institutional:

- absence of a "bottom up" approach to sea safety;
- lack of recognition of sea safety as part of fisheries management;
- poor state of fishers' organizations (*inter alia* leads to poor responsiveness to sea safety measures).

GROUP 4 – TECHNOLOGY

1. Boat design:

- Fibreglass vessels – advantages:
  – seaworthy,
  – last longer,
  – lighter → higher speed,
  – easier to repair,
  – easy to maintain,
  – easily modified,
  – easy to clean,
  – self-bailing,
  – easy to transport,
  – code of standards could be applied.
- Wooden vessels:
  – wood is scare in the market, forest,
  – maintenance is more difficult,

  - skills are disappearing,
  - harmful to the environment,
  - expensive material.
- Wood versus fibreglass:
  - Traditional construction should be continued/allowed as long as it gives seaworthy boats (grandfather clause).
  - Standard requirements should be defined in relation to risks; voluntary compliance preferred.
  - Fibreglass is not safer just because it is fibreglass.
  - It is difficult to make modifications to traditional designs (inboard engine installation).
  - Fibreglass reinforced plastic (FRP) offers many new possibilities – but FRP vessels sink if they are water filled and if floating compartments are not installed and maintained.
  - Fisheries projects deliver FRP boats, but maintenance stops when project ends, and the boats deteriorate.
- Mechanization:
  - Oars and sail are preferred in many situations for economic reasons.
  - When there is a shift from sails to engines, fishers are very vulnerable.
- Training:
  - building boats;
  - communications, radio;
  - navigation;
  - install equipment;
  - for operation.

2. Material/concerns:

- radio (VHF, GPS, AM/FM), radio frequencies;
- batteries → failures;
- mirror;
- radar reflector;
- anchor/rope;
- compass;
- aware of the risks on board;
- conscious of climatic changes;
- flares;
- life jackets;
- registration of the vessel;
- quality of fuel;
- water and first-aid kit on board.

Annex 8
Recommendations of the working groups

GROUP 1 – FISHING OPERATIONS

1. The law to be amended/improved/strengthened to provide for minimum mandatory safety requirements for fishing vessels and fishers.
   – Lead agency: fisheries authorities.
   – Technical support: FAO.

2. The fisheries authorities to be the lead agency for safety issues for fisheries.

3. Appropriate structures and mechanisms to facilitate acquisition of safety equipment:
   - credit facilities,
   - duty remission/concession on importation of safety items,
   - subsidies
     – Lead agency: fisheries authorities.
     – Source of funds: government and development banks.

4. The delivery of special weather forecasts for fishers.
   – Lead agency: Government.
   – Source of funds: Government.

5. An appropriate structure and mechanism should be set up for capacity building for small-scale fishers in safety at sea:
   - training of trainers, extension officers, inspectors or enforcement officers;
   - training of fishers;
   - awareness programmes.
     – Lead agency: fisheries authorities.
     – Source of funds: donor agency / government.

6. Provision of infrastructure support for safety at sea:
   - engine repairs and maintenance facilities;
   - VHF marine repeater communication system.
     – Lead agency: fisheries authorities.
     – Source of funds: donor agency.

GROUP 2 – DATA COLLECTION

1. National
   - Each country should set up a long-term system of collection, storage and analysis of data on safety at sea.
   - Preferably, because this is data on fishing activity, this role should be with the statistics section of fisheries departments.
   - An environment should be established to facilitate the harmonious exchange of this information by all the agencies responsible for safety at sea. This could be done by regular collaborative meetings between agencies, mobilized by the head of the fisheries department.
   - It is important that this information is not only stored but analysed and distributed regularly and at least annually.

- Government and community should be sensitized on the importance of this information so that this function is properly funded and supported.
- Requirements: functioning statistical section with trained officers in database management, analysis and reporting; computing system; communication system.

2. Regional
   - Countries should decide on the importance of safety at sea and mobilize resources nationally or otherwise to establish a data collection system on safety of fishers at sea within their fisheries departments (statistics section).
   - Countries should be prepared to provide this information regularly to a regional structure (e.g. the SWIOFC or a regional organization) in order for it to be collated regionally.
   - The SWIOFC or other regional organization must make available this information to countries of the region in annual or other bulletins and on a Web site. The sensitivities in relation to the distribution of this information should be considered.
   - A standardized schema on the information required should be provided by the SWIOFC or the regional organization concerned.
   - The SWIOFC or other organization should review this information from time to time and draw the attention of member countries to the status of safety at sea regionally in order for members to decide on related further measures to be taken.

GROUP 3 – LEGAL FRAMEWORK

1. General
   - Recognize the importance of small-scale fisheries in the Indian Ocean region.
   - Recognize the importance of safety of fishers along with fisheries conservation and management measures.
   - Generate sufficient political will to address sea safety issues in relation to fishing, in particular, saving life and property in small-scale fishing, at different levels.

2. Coherence
   - Entrust mandate for coordinating sea safety measures in small-scale fishing to a single agency with sufficient emphasis on harmonizing existing programmes and effective coordination of relevant agencies.
   - Integrate sea safety programmes into fisheries development and management programmes in a coherent manner.

3. Legislation and policy
   - Develop and implement appropriate legislation/policy to effectively address sea safety issues specific to various aspects of fishing operations at different levels, particularly in the small-scale subsector.

4. Implementation of sea safety in small-scale fishing operations
   - Develop capacity at the regional, national and local levels to implement and enforce sea safety measures in a timely and cost-effective manner with due emphasis on prevention.
   - Adopt a consultative approach to developing sea safety policies and programmes in fishing with the involvement of relevant stakeholders at different levels.

5. Capacity building
   - Develop appropriate training programmes in sea safety.
   - Make available sufficient financial resources for sea safety programmes.
   - Provide subsidies to fishers to acquire sea safety equipment that is essential to the safety of their life and protection of their equipment, as well as financial assistance to fishers to undergo training.

- Involve fishers' organizations such as associations, cooperatives and trade unions, and community organizations, including women's groups, in sea safety programmes at various levels.
- Provide training on risk assessment for different types of fishing operations under different sea conditions.
- Provide exchange programmes on successful initiatives in sea safety programmes in the small-scale subsector that are relevant to countries in the region.

6. Awareness-building
   - Develop awareness programmes on sea safety among small-scale fishing communities, with due emphasis on prevention of accidents at sea.
   - Include sea safety programmes for small-scale fishing in school curricula.

GROUP 4 – DATA TECHNOLOGY

1. Boat design, repair and maintenance:
   - Fibreglass (FRP):
     – Better availability of maintenance workshops and material.
     – Fishing cooperatives and communities should participate in operating workshops, designing boats, etc.
     – Establish standards, conditions for design and construction, including floating compartments.
     – Projects to introduce FRP boats should have a component of FRP maintenance.
     – Introduce standard FRP boat designs suitable for different environments.
   - Wooden boats:
     – Promote the use of wooden boats where it is safer (rocky shores, reefs, etc.).
     – Arrange credits system for maintenance in order to extend the life of wooden boats.
   - Mechanization:
     – Develop extension guidelines on engine maintenance, repair and operation.

2. Training:
   - Provide training in:
     – engine maintenance, repair and operation;
     – installation and operation of navigation and communications equipment,
     – design, building and maintenance of FRP vessels according to the natural environment of the area.

3. Equipment:
   - Develop standards on the basis of boat length/capacity/engine power and operational area for:
     – communication equipment;
     – navigational equipment;
     – safety equipment.

4. Material:
   - Ensure the supply of:
     – high-quality engines and spare parts;
     – high-quality fuel and lubricants.

Annex 9
Recommendations on how the countries of the South West Indian Ocean region can utilize the Grenadian experience

Roland Baldeo

The countries that attended this workshop were:
- Comoros,
- Kenya,
- Madagascar,
- Maldives,
- Mauritius,
- Seychelles,
- United Republic of Tanzania,
- Yemen.

At the safety at sea workshop held in Moroni, the Union of the Comoros, from 12 to 14 December 2006, all the participating countries presented country reports.

Details were provided on the safety at sea programmes currently being underway in each country.

Some of the countries had some safety at sea programmes for their fishers while most had few or no programmes targeting sea safety.

The safety at sea programmes that have implemented successfully in Grenada cannot be adapted wholesale in each of the participating countries. However, each individual country can develop some of these programmes and adapt them to suit their individual country needs and conditions.

Some of these programmes can also be implemented with very little financial support.

The following are some of the safety programmes that have been implemented successfully in Grenada and can be implemented in all or some of these countries immediately:
- Safety at sea legislation (all): Safety at sea legislation should be enacted in each of the participating countries. This is the first step in preparing a meaningful programme for fisher safety in any country. In formulating new legislation for a particular country, reference could be made to countries that have already enacted safety at sea legislation.
- Public awareness on safety at sea (all): In each country, the respective fisheries department can begin a programme to sensitize and create public awareness about safety at sea. This programme does not necessarily require a large budget. Local radio stations and newspapers will be willing to publicize information on sea safety. If approached, stakeholders in the industry will be more than willing to sponsor flyers, posters, etc. promoting safety at sea for fishers.

- Weather information for fishers (all): A programme to provide weather information to fishers is of critical importance in each country. From the reports provided from each country, this seems to be one of the underlining factors contributing to the loss of fishers at sea. Even in rural villages where dugout canoes operate from, a programme to provide weather information should be made accessible to the fishers. Each country could decide the most suitable medium for disseminating weather information to fishers on a daily basis, especially during the typhoon/hurricane season.
- Accident data recording (all): A system to begin recording data on all distress and accidents at sea can be initiated in each country. This programme requires few financial resources and could be undertaken by fisheries departments immediately. Forms to record this data can be kept at all landing sites by fisheries department officials or community leaders and could be collected monthly or quarterly.
- "Duty-free" on safety items (all): In each of the participating countries, governments should approve duty-free concessions on the importation of all safety items used and required by fishers. This would make safety items more affordable to local fishers.
- A designated agency for sea safety (all): Each country should designate a government agency that would have the responsibility for safety at sea programmes and the implementation of these programmes.
- National safety at sea workshop (all): Each country should make plans for convening a national safety at sea workshop. Fishers from the main fishing districts/villages, stakeholders in the industry, and government agencies relating to sea safety should meet to discuss plans for a sea safety strategy for the country.
- Training programmes on safety at sea (some): Each country should decide on the areas of training that are critically needed in sea safety based on the most frequent causes of distress at sea. Areas of training that can be considered are:

– basic coastal navigation;
– proper use of life jackets, marine transceivers, and other safety devices;
– sailing skills and boat handling;
– captaincy training for operators of fishing vessels.

- Fishing vessel safety inspection (some): Some of the participating countries can begin a form of safety inspection of their fishing vessels immediately. In other countries, this process will have to be introduced after initiating some of the above-mentioned programmes.
- Marine communications system (some): The setting up of a marine repeater system for ship-to-shore radio communication by fishers in the participating countries is of the utmost importance in helping to save lives at sea. Governments may be able to request and receive free infrastructure access from existing mobile telephone providers in their respective countries.

The Regional Workshop on Safety at Sea in Artisanal and Small-scale Fisheries in the South West Indian Ocean was held in Moroni, Union of the Comoros, from 12 to 14 December 2006. Forty-one experts from the South West Indian Ocean (SWIO) region including an expert from Sweden and representatives of FAO participated. The workshop was organized and implemented by the Fishing Technology Service of the FAO Fisheries and Aquaculture Department, in close collaboration with the FAO Subregional Office for Southern Africa. During the workshop, the results of the Study on safety at sea in artisanal and small-scale fisheries in the South West Indian Ocean, conducted in May 2006, were presented. In addition, seven experts from SWIOFC member States made presentations and took up matters affecting safety at sea in their countries. Experts from Grenada, Sweden and FAO made presentations on global and regional aspects of safety at sea that enriched the information provided to the delegates. The information presented was debated in four working groups on different themes covering fishing operations, data collection, legal framework and technology.

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