SEA SAFETY ISSUES RELATED TO FISHING VESSELS

CREDIT SEMINAR

DATE: 24-12-2016

RAMESH KUMAR

MFT 15063 (FET)

DEPARTMENT OF FISHING TECHNOLOGY AND FISHERIES ENGINEERING
FISHERIES COLLEGE AND RESEARCH INSTITUTE
THOOTHUKUDI-628 008
ADVISORY COMMITTEE

CHAIRMAN : Dr. B. Sundaramoorthy
Professor and Head,
Department of Fishing Technology and Fisheries Engineering
FC&RI, Thoothukudi –08

MEMBERS : Dr. N. Neethisivelan
Professor and Head,
Center for Fishery Technology Training and Incubation Center (PH)
FC&RI, Thoothukudi –08

: Dr. S. Athithan
Professor and Head,
Department of Fish Nutrition and Feed Technology
FC&RI, Thoothukudi –08
CONTENTS

1. Introduction
2. Sea safety issues
3. Sea safety issues
4. Types of accidents
5. Causes of accidents
6. Sea safety legislation
7. Design & safety aspects of a fishing boat standards
8. Sea safety management
9. Sea safety management cycle
10. Sea safety recommendations
11. Pre – departure check list
12. SAR (search and rescue) deployment in india
13. Recent techniques uses in fishing vessels to prevent loss of life at sea
14. Conclusion
15. Reference
SEA SAFETY ISSUES RELATED TO FISHING VESSELS

Introduction

Fishing at sea recognized as a most dangerous occupation in the world. Near about 50% (over 3 billion people) of the world's population live within 60 km of the coastline and mostly these people directly or indirectly depends on the fisheries. In world, around 38.3 million fishers are working on 4.36 million fishing vessels operation in the capture fisheries in which about 98% these fishing vessels are below 24 m in length and these vessels are not covered by any international rules and regulations. The annual toll deaths first estimated more than 24 000 deaths per year (FAO, 1989), later confirmed by the International Labor Organization (ILO, 2000a) and 70 fatalities per day of fishermen worldwide (FAO, 2015). The issue of safety in the fishing industries was again raised in March 2007 and FAO Committee on Fisheries (COFI) conducts a program in which a large number of participants expressed concern on sea safety, especially in small-scale fishery. Injuries, loss of life and property at sea due to accidents are the serious matter in fishing industries for both developed and developing countries and 80% of accidents are caused by human error and most of these errors can at some point be attributed to management deficiencies that create the pre-conditions for accidents. The Bay of Bengal is considered one of the meanest seas in the world in which fishermen operating without safety equipment which lead to hazardous life, very little work has been done on safety of artisanal fishermen in India (SPC, 2006).

In India, there are about 4 million fisher folk populations comprising in 8, 64,550 families living in 3,288 marine fishing villages with a coastal length 8,129 km. The total number of crafts 1,94,490 comprising 72,559 (37.3%) mechanized
crafts, 71,313 (36.7%) motorized crafts and 50,618 (26%) non-motorized crafts (CMFRI, 2010). Fishermen mortality rate around 87/100000 fishermen population (BOBP News, 2015).

In Tamil Nadu, over 1,200 marine accidents during the year 2000 to 2007 in small scale fishery (Swamy, 2009). Boats under 24 m divided into three groups, catamarans (35,000) lografts length 4.5 to 8 m, vallams (8,000) generally in length 8 to 9 m FRP (fibre-reinforced plastic) replaces wood and mechanized crafts (12,000) length between 11 to 15 m with main engine power 70 to 120 HP (BOB News, 2005). The total number of crafts 38,788 comprising 5,735 (14.78%) mechanized crafts, 27,899 (71.92%) motorized crafts and 5,154 (13.28%) non motorized crafts (Govt. Fisheries Department, 2015).

A number of factors has been identified which affects positively or negatively on the safety of the fishing vessels at sea; such as safety regulations, safety standards and equipments (i.e. vessels examinations, emergency lifesaving equipments, safety drills), vessel characteristics (i.e. age, size, design, construction, materials, maintenance, stability, working space, watertight integrity), human causes (i.e. operation, crew training and competency, weariness, communication, navigational error), weather conditions, socio and economic environment of fishery, fisheries management practices etc. In our country boat and boat, boat and ship collisions are very common, because of there is no effective communication system for the fishermen to communicate properly in distress time due to lack of proper fishing vessel monitoring and controlling system in, Search and Rescue mechanism at sea is also poor.

Sea safety issues
There are ten major sea safety issues of fishing vessels; (i) Fishing vessel stability, (ii) Life saving appliances, (iii) Safety information, (iv) Regulatory approach to safety, (v) Training, (vi) Safe work practices, (vii) Weariness of the crew members, (viii) Cost of safety, (ix) Fisheries Resource Management and (x) Sea accidents and causalities statistics. Other issues are how to improve sea safety, communication issue on a number of emergency, problems with outboard engines major cause of accidents in small fishing vessels and knowledge of weather. Many fishermen, while accepting that fishing is dangerous, staunchly defend their independence. Some fishermen opposes to the proposed laws and additional regulation to increase safety. Many of the deep sea going fishermen are harassed by the authorities in neighboring countries on trans-boundary issues (such as; Sri Lanka, Pakistan, Bangladesh, Gulf countries Maldives).

Sea safety issues in Tamil Nadu are; registration of boats is required however, follow up is not clear; enforcement of rules for safety equipment is seriously lacking; control of qualifications and training of crew is deficient; there are no rules for design and construction; FRP boat building of poor quality; lack of marine accident statistics (BOBP News, 2005).

Types of accidents

Capsize of fishing boats

Most common type accidents of fishing vessels these are mostly due to poor stability, heavy load on deck, water trapped on deck and rough seas which
cause small boats to turn turtle in water. This accident happens suddenly without warning and fishermen don’t get time to use safety equipment.

**Drifting due to engine (power) failure**

This type of accident affects only power driven boats in the small scale fishery due to bad engine installation, bad engine maintenance, lack of fuel and lack of experience. Fisherman loses power to steer and maneuver his boat leading to drifting. Generally, fishermen are not skilled or trained in performing repairs to the engine and hence this accident leaves the men helpless and stranded at sea.

**Surf crossing accidents**

Surf crossing accidents occurs at the high surf area of the beach (continental slope is steep), rescue operations are possible but casualties are high as the surf area is turbulent and consists of breakers which severely affect the maneuverability and stability of boats. It is done in beaches where fishermen have no access to safe havens or shelters and harbors.

**Onboard injuries**

Most of the injuries reported on fishing boats are from the handling of hooks, nets and mainly from overhanging wooden stays used in sail rigs which cause head injuries to fishermen during the movement of boats and sails at sea.

**Collisions**

Collision of fishing vessels mostly occurs in night time due to lack of lightings, navigational light and tired crew. Mostly small fishing boats have not source of power for light in dark light and they depend on kerosene lamps and
hand-held flashlights to be conspicuous at sea during night time. In areas of intense fishing activity, collisions are common and lead to accidents.

**Falling overboard**

Falling overboard accident on the fishing boats due to slippery deck, unprotected machineries, tired crew and use of alcohol, narcotics. Work while fishing requires fishermen to bend over the boat’s edge into the sea and the movement of boats in choppy seas results in frequent falls overboard. A person falling overboard can easily get in the way of the running propeller, particularly in long tailed OBMs, and can get seriously hurt.

**Loss of way or disorientation**

Loss of way means loss of the sense of direction which causes fishermen to stop their boat, drift aimlessly and wait for the sky to clear up or coastal features to become visible if they are in inshore waters. It is dangerous in small boats as fishermen rarely carry extra food, water and fuel. This type accident commonly happens with those boats which have not carry navigational instrument such as compass, nautical chart, GPS etc.

**Hull cracks**

Hull cracks are normally caused due to use of poor quality boat building materials, bad construction, bad boat maintenance, overload of catch, boat is weakened by age or has construction flaws and stresses on boat by the pounding of water waves.

**Fire on Boards**

This type of accidents occurs on fishing vessel due to bad engine installation, engine breakdown, bad installation of cooking stove etc.

**Illnesses due to bad health**
Illnesses like tension and heart attacks suffered by the fishermen due to the new physical regime ushered in by the advent of engines and lack of experience. Fishermen no longer row on their boats and are hence less physically active.

Running aground

This type accident commonly exploring in new fishing grounds they may run into underwater obstructions (rocks, reefs and banks) as the area is unfamiliar and unaware of the location of these obstructions which hazardous to navigation but boats run against these obstructions in adverse weather and visibility conditions leading to serious consequences.

Bites from poisonous sea creatures

It is hazardous due to contacts with poisonous sea creatures which may be injuries and sometimes fatal. Stings, bites, penetrations, external or internal poisonings casualties normally occur in the boat during handling the catch. For example, Puffer fish (most venomous fish and is the second-most poisonous vertebrates in the world), Stonefish (storehouse of venom. It has virulent potent venom stored in its glands, at the bottom of its 13 needle-shaped dorsal fin spines. Most victims injury themselves as they touch or step on it accidentally), Viperfish, Vandellia cirrhosa,

Lightning strikes

Lightning strikes at sea cause great damage to both life and equipment. It is natural phenomenon and occurs in bad weather condition, in most cases boats have been completely destroyed and lives lost.
Capsize of fishing boats

- Poor stability
- Heavy loads on deck
- Water trapped on deck

Drifting of fishing boats

- Bad engine installation
- Bad engine maintenance
- Lack of fuel
- Lack of troubleshooting experience

Collision

- Lack of navigation lights
- Tired crew

Falling overboards

- Slippery decks
- unprotected machinery
- Tired crew

Hull cracks

Surf crossing accidents
Causes of accidents

The major cause of accidents at sea is due to the Human error, vessel overloaded, entanglement of fishing gears, operational error, rudder failure, engine failure, fishing gear rope in propeller, leakage water ingress, structural failure, electrical failure, fuel leakage, act of other vessel, extreme weather, other technical failure and other external cause.

Sea safety legislation

The inland and coastal marine fisheries (up to 12 nautical miles) are under the control of the state governments, beyond that and up to the end of the EEZ (up to 200 nautical miles) within the jurisdiction of the Central Government (As
per the Constitution of India). Important regulations are Life Saving Appliances (LSA), Fire Appliances (FA), Manning and Prevention of Collisions (MPC) at Sea. Every country has different regulations prescribed by its Government. The objective of these regulations is to promote safety of life at sea and efficient maintenance of vessels. The ship construction, repair and maintenance, fishing area, size of the vessels are governed by the following safety legislation such as; Indian Fisheries Act, 1897; Merchant Shipping Act, 1951; International Regulation for Preventing Collision at Sea, 1972; Safety of Life at Sea (SOLAS), 1974; Occupational Health & Safety Act, 1993; Maritime Occupational Safety Regulations, 1994 etc.

**Design & safety aspects of a fishing boat standards**

Food and Agriculture Organization (FAO) does not have standard boat designs as conditions differ and requirements are varying through all over the world. Food and Agriculture Organization (FAO), International Maritime Organization (IMO) and International Labor Organization (ILO) are working under the framework of the United Nations and have jointly developed guidelines and codes to ensure and enhance the safety of fishing boats at sea. The various design and safety aspects covered under the international codes and guidelines are:

i. Construction, watertight Integrity and equipment.

ii. Stability and seaworthiness.

iii. Machinery and electrical installations.

iv. Fire protection, fire detection, fire extinction and firefighting

v. Protection of the crew

vi. Life saving appliances and its arrangements
vii. Emergency procedures, musters and drills
viii. Radio communications
ix. Navigational equipments and its arrangements
x. Crew accommodation

**Sea safety management**

Safety of fishermen at sea needs both a bottom-up and a top-down approach, to avoid/minimize accidents at sea must be cooperate together the authority (safety regulations, safety information, training and enforcement of regulations), boat builder (high quality in construction and equipment), boat owner (caring the safety for crew, maintenance of boat and equipment) and boat crew (safe operation and good maintenance). Improvement of fishermen safety should always start with collecting information on accidents, type of accidents and cause of accidents; this will be the platform for developing the strategies for improving sea safety, the most important issue is a reporting system or reporting structure.
Sea safety management cycle

It plays a vital role in improving the safety for fishermen at sea. The purpose of the cycle collect the information of accidents at sea and report to the safety management system to identify the cause of accidents and take proper action in order to minimize the accident and help to the victims. It involves into two stages:

(i) **Proactive (before accident):** Mitigation and Preparedness

(ii) **Reactive (after accident):** Relief and Rehabilitation
Sea safety recommendations

International, national and regional organization (FAO, IMO, ILO, BOBP-IGO, Governmental/Non-Governmental organizations, fisher societies, private sector) work together to develop a safety guidelines to ensure and enhance the safety of fishing vessels. These recommendations that improve the boat safety at sea which includes:

- Should be a legislative support to the regional, national and international level.
- Implementation of appropriate and sensitive rules and regulations.
- Determine the minimum mandatory requirement for fishing vessels.
- Make suitable sea safety policy and strategy deal with the safety of fishing vessels at sea.
- Raise the effectiveness of sea safety training/awareness programs.
• Develop a system for aware and distribution of effective, efficient, appropriate and updated materials for fishing vessels as well as safety equipment.

• Formation of new institutions and development of existing institutions and community based societies.

• Collect good information on vessel accidents and maintain sea accidents database.

• Formulate the investigation team for fishing vessel registration and time to time inspection schemes.

• Formal and informal training to fishers, fisher’s communities, government staff, NGO’s, private sector and other fishing related stakeholders.

• Develop a separate SAR boats for fishing vessels.

• Awareness and distribution of new techniques to avoid the accidents at sea (Distress Alert Transmitter, FM technology, Search And Rescue Aid Tool, OceanNet, FFMA, Radio Monsoon etc.)

**Pre – departure check list**

Pre-departure checklist is the first stage of safety at sea; it should be completed by skipper. All equipment on safety certificate is to be always onboard. A systematic and proper pre-departure check of critical equipment/machinery, tools and procedures of the vessel daily prior to leaving the dock that help to avoid accidents (vessel damage, injuries, loss of life and loss of property at sea), it includes:

1. **Freshwater and food materials:** daily check and keep freshwater and ration as per the requirement according to the number of the crew member and fishing trip.
2. **Fuel**: check the fuel tank and fill the fuel according to the fishing distance and fishing duration requirement and keep some extra fuel for emergency.

3. **Vessel structure**: vessel’s stability and structural condition must be satisfactory, close all doors, hatches, and openings critical to the vessels and should be watertight integrity.

4. **Lifesaving equipment**: check the lifesaving equipment and it should be in correct order according to requirements (life jackets, buoyancy aids, immersion suits, inflatable life raft, small boats or skiffs, distress flares, markers, EPIRB).

5. **Mechanical and electrical parts**: check the supplied all necessary components, products, equipment, basic spare parts and tools.

6. **Fire fighting**: check the fire detection, fire-fighting equipment and alarm systems.

7. **Navigation and transmission equipment**: perform a complete operational check of Radar, GMDSS (global maritime distress and safety system), navigation lights, flags, shapes, sound signal appliances, radio communications equipment (VHF radio).

8. **Steering, Engine controls**: check the steering gear and engine controls to ensure that they are in good working condition.

9. **Electrical equipment**: check the following equipments such as; emergency electrical power source, battery as an emergency electrical power source, emergency electrical fire pump and emergency lighting.

10. **Propulsion and transmission equipment**: Check the equipment and any other relevant equipment regularly serviced in line with the manufacturer’s
instructions such as; engines and remote alarms, generator, engine gearbox etc.

11. **Other equipment:** anchoring equipment, rope, compressed air systems, bilge pumps and remote alarms etc.

**SAR (Search and Rescue) deployment in India**

India, since ratification of the SAR Convention in 1979 and formulation of the National Maritime Search and Rescue Board (NMSARB) in 2002, has come a long way in terms of establishment of National Search and Rescue Apparatus. National Maritime Search & Rescue plan, brought in force in 2002, and as amended in 2013. The Indian Coast Guard is responsible for coordinating SAR operations in the Indian Maritime Search and Rescue Region (IMSRR). The Coast Guard SAR response involves multi-mission stations located in all maritime states, Coast Guard ships and Coast Guard aircraft linked by communication network. The Indian SRR is divided into three regions, each with an assigned Maritime Rescue Coordination Centre (MRCC):

1. Mumbai (Bombay – West coast )
2. Chennai (Madras – East coast)
3. Port Blair (Andaman and Nicobar Islands)

In the Indian **SRR** (Search and Rescue Region), ten Maritime Rescue Sub Centres (**MRSC**) have been activated. The respective areas of the Maritime Rescue Sub Centre (**MRSC**) and their location are as follows:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Area</th>
<th>Maritime Rescue Sub Centre (<strong>MRSC</strong>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gujarat</td>
<td>Porbandar</td>
</tr>
<tr>
<td>2.</td>
<td>Karnataka</td>
<td>New Mangalore</td>
</tr>
<tr>
<td>3.</td>
<td>Kerala &amp; Lakshadweep Islands</td>
<td>Kochi</td>
</tr>
<tr>
<td></td>
<td>Tamil Nadu (Gulf of Mannar)</td>
<td>Tuticorin</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>5.</td>
<td>Andhra Pradesh</td>
<td>Vishakapatnam</td>
</tr>
<tr>
<td>6.</td>
<td>Orissa</td>
<td>Paradeep</td>
</tr>
<tr>
<td>7.</td>
<td>West Bengal</td>
<td>Haldia</td>
</tr>
<tr>
<td>8.</td>
<td>Andaman Islands</td>
<td>Diglipur</td>
</tr>
<tr>
<td>9.</td>
<td>Nicobar Islands</td>
<td>Campbell Bay</td>
</tr>
<tr>
<td>10.</td>
<td>Goa</td>
<td>Marmagao</td>
</tr>
</tbody>
</table>

Recent techniques uses in fishing vessels to prevent loss of life at sea

**OceanNet**

It is a unique innovation. Such technology does not exist anywhere in the world. It will help save lives of fishermen in distress to stay in touch with their families and communicate with authorities and help in strengthen national security by allowing them to inform the authorities about any suspicious activity at sea. At present, the mobile towers located on land provide connectivity only up to 40-45 km into the sea, whereas OceanNet will provide connectivity up to 60 km. Amrita University developed this technology, through this fishermen can use email, skype, whatsapp and other internet based applications. A Wi-Fi network is provided aboard the fishing vessels to which fishermen can connect using their smartphones.

**FM Technology**

An NGO, Nesakarangal Trust, launched a community radio (Community radio-Kadalosai 90.4 FM) for the fisher folk in Rameswaram. It is a typical FM radio packed with lifesaving information and entertainment. Radio station manned
by local youth fishermen community trained by expert. After we go for fishing, weather forecast might change suddenly and there will be no way of getting information, radio useful in such case.

**FM Technology**

An NGO, Nesakarangal Trust, launched the community radio - Kadalosai 90.4 FM for the fisher folk in Rameswaram on April 14.

The content of the programme include both entertainment as well as vital information for fishing community:

- Weather
- Fish movement
- State and central government schemes to fishermen community

The NGO, which works among fishermen, has obtained licence from the central government to launch the community radio.

The radio station will be manned by local youth from fishermen community with a couple of volunteers being trained by experts.

**Radio Monsoon and MSSRF**

Radio Monsoon and MSSRF multimedia are the first such interventions aimed at fisherfolk safety and welfare in India.
Mobile Apps (Fisher Friend Mobile Application)

Fisher Friend Mobile Application (FFMA) is a mobile application for fishermen safety at sea launched by INCOIS and MSSRF in 2013. It is a unique, single window solution for the holistic shore-to-shore needs of the fishing community, providing vulnerable fishermen immediate access to critical, near real-time knowledge and information services on weather, potential fishing zones, ocean state forecasts, and market related information. Developed on an android platform in partnership with Wireless Reach Qualcomm and Tata Consultancy Services and is currently available in English, Tamil, Telugu, Malayalam, Kannada, Marathi, Hindi and Bengali. Currently over 9,343 fishermen use it and 93 fishermen rescued, by enabling them to use the GPS capability to report their location to the Indian National Coast Guard.
Distress Alert Transmitters:

Distress Alert Transmitters (DAT) developed by the Indian Space Research Organization (ISRO), this device had four options with indications for medical assistance, rescue in case of drowning, fire and vessel sinking. Coastal Security Guard (CSG) and the Indian Coast Guard (ICG) stressed the need for fishermen to possess the Distress Alert Transmitter (DAT) while fishing at high seas. The fishermen could seek the assistance by pressing a button. Once the fishermen pressed a button for assistance, the ISRO would receive a message at its headquarters in Sriharikota and after decoding the message, it would alert the Maritime Resource Coordination Centres in Chennai, Mumbai and Port Blair.

To ensure the safety and security of fishermen and to disseminate information about weather warnings provide “Seamless Communication Network”
to all fishing crafts operating in coastal district of Tamil Nadu under World Bank financial assistance. Tamil Nadu Government supplied Distress Alert Transmitters (DAT) with 90% subsidy to 1600 fishing vessels may be mechanized and announced to supply of “Distress Alert Transmitters” to 30,000 fishing crafts towards supply of various sea safety equipments including “Search and Rescue beacon” otherwise called “Distress Alert Transmitter” to fishermen under the scheme “Safety of Fishermen at Sea”. Government of India contribution 75%, State Government contribution 15% and beneficiary contribution 10% of cost of DAT.

**SARAT (Search And Rescue Aid Tool)**

INCOIS develops SARAT (Search And Rescue Aid Tool) to save life and property at sea. The SARAT (Search And Rescue Aid Tool) launched to the
nation during the XV National Maritime Search and Rescue (NMSAR) Board meeting held in New Delhi on 27 July 2016.

**Conclusion**

Mostly in our country marine accidents happens due to lack of experienced crew member, training and education system, proper communication and information system, approved life saving appliances, navigational equipments, poor vessel stability, standardization in vessel design and construction, ignoring the rules and regulations of safety etc. There is need for good commitment and a political will to ensure sea safety activities, implementation of proper sea accident reporting system, cause of accidents, effective and raising training and awareness program, availability of sea safety equipment at low cost, improving boat building skills, safety recommendations and guidelines for the boat construction and equipment of fishing vessels with emphasis on adoption and carriage of safety equipments, community based search and rescue (SAR), training in first aid for at least one member of each boat. Determine the minimum mandatory requirement for the fishing vessels and enforcement to its implementation.

**Reference**


