

First Consultation on Safe Boat Design and Boat Building to FAO Standards



PROCEEDINGS AND RECOMMENDATIONS

29-30 July 2015

Organized by

IEEE Artisanal Deep Sea Fishers SIGHT
Association of Deep Sea Going Artisanal Fishermen
South Indian Federation of Fishermen Societies

Presented by

J. Vincent Jain
Chief Executive-ADSGAF
Executive-SIFFS
Chairman-IEEE Artisanal Deep Sea Fishers SIGHT
College Road, Shark Street, Thoothoor P.O
Kanyakumari District, Tamil Nadu, India-629 176
www.deepseafishersindia.org

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Preface

In India, seafaring is centuries old and boat building traditions have been passed on from one generation to the other. Earlier bigger boats were built mainly for trade and public transport purposes but with the advent of commercial fishing, the traditional dugouts, dinghies and catamarans started giving way to larger wooden boats. Later with mechanization in the fisheries sector and the need to fish in deeper waters, boat building changed with new adaptations and new boat building materials coming into use. This also brought in many boat builders with limited or no prior experience in constructing fishing boats, where requirements differ from the cargo or passenger boats. However, despite these dynamic changes happening in the fisheries sector and the exponential increase in the number of mechanized and motorized fishing boats in the country, little attention has been paid to the organization of this activity in terms of developing guidelines/standards or regulating the construction of boats.

While international/regional organizations, mainly from the UN family, as also many countries matched the pace of fishing practices by bringing required changes in their boat building norms/standards, countries like India have lagged behind. Resultantly, fishing boats in India are a couple of generations behind as compared to their counterparts in developed countries. Even our neighbouring countries like Sri Lanka and Maldives are way ahead in this field with respect to the design, quality of construction and sea-worthiness of their fishing boats.

With the increasing pressure on coastal resources and depleting stocks in the near-shore waters of the country, many fishers are venturing into the offshore/deep sea in pursuit of livelihoods. States like Tamil Nadu are conscientiously moving a part of their near-shore fishing fleet to deeper waters by subsidizing construction of tuna long liners-cum-gillnetters. This development again brings to focus the need for good boat designs and certified boat building yards where quality construction can take place. The diversity of fishing that exists all along the country's 8000+ km coastline further necessitates variety of designs to meet the requirements of different gear as also to match them with the needs of the fisher groups. In other words, a bouquet of designs are needed as also good number of certified boat building yards in the coastal States of the country.

Since the early nineties, fibre-reinforced plastic (FRP) material has virtually replaced conventional boat building material such as wood and steel. While on one hand FRP offers the benefit of ease and flexibility in boat building, it also results in poor quality construction if carried out by untrained hands and in poor environment (*e.g.* excess heat, humidity, etc). The poorly built FRP boats during the post-2004 December Asian tsunami period in India are good examples of this. FRP as a boat building material has gained immense popularity in the country, therefore, it is essential that all technical aspects of FRP use in boat building are set as standard norms and the boat building yards adhere to such norms.

Standard boat designs with good boat-building practices and certified boat yards are still not part of any government agenda, either at the State or Central level in India. Boats continue to be poorly designed and built in yards that lack basic facilities, more so when handling materials like the FRP. In this conspicuous void of policy and regulation with respect to boat building in the country, the consultation organized by the Association of Deep Sea Going Artisanal Fishermen is an important and bold step. It is hoped that this and subsequent consultations on the subject under the aegis of AD SGAF and others will highlight the importance of good boat building in the country and catalyse the process. Both the Central and State Government, who are responsible for policy-setting and regulations, need to consider this as a matter of urgency. Since standard setting and providing legal support to the agreed norms/standards is a time consuming affair, the sooner it is done the better it would be for the fisheries sector in the country.

Y S Yadava

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Introduction

Fishing at sea is probably the most dangerous occupation in the world, according to the International Labour Organization (ILO). The annual death toll among fishermen, has been estimated at 24,000 worldwide by the ILO. With more than 70 fatalities per day, fishing at sea may be the most dangerous occupation in the world, according to a new report released by the UN Food and Agriculture Organization (FAO) of the United Nations. The safety of fishing vessels and fishers involves several interrelated components, such as the design and construction of the fishing boat and the equipment used. On fishing boats, particularly small vessels, crews have to work at sea, on deck in all weathers, frequently with hatches open, in order to locate, harvest and preserve their catch. Working conditions in the boats are poor, especially the night lightings in the boats and that increase the strain of the crew on board.

Why the Consultation on "Safe Boat Design and Boat Building to FAO Standards"

When we build a house, we will carefully execute various activities from foundation excavation level to the finishing. We will watch the depth of the excavation, we will periodically monitor the cement mixture use for construction, we will also pay attention to the selection of bricks, steel rods, and other materials. Above all, we will give priority for Vaasthu, the ancient Indian architectural science. We will specify room sizes, allocation of the kitchen, which faces rising sun and so on and so forth. Most homes are built on the basis of a drawing, which must be prepared by a qualified engineer. This is mandatory. Most constructions are executed under the close supervision of engineers. There will be an authority to certify the drawing and approve the house plan. All of this shows the importance and attention to details given by us to the house where we will be living. We need a good and safe home to lead a happy life with our family.

Artisanal Deep sea fishermen spend up to Rs.30 lakhs for building a house and Rs.60 lakhs for building a boat. Despite spending twice the amount, they don't even have a drawing for the boat and no naval architect or the equivalent of a certified engineer involved in boat building. The owner of the boat might not know the optimum thickness of the hull. They might not be aware of the design and size of the wheel house and the actual dimensions of the boat. The boat builder may use sub-standard materials for building boats, which boat owners may not be aware of. The boat owner has little or no control over construction of the boat. Most of the things are decided by the boat builder.

About the Organizers

IEEE Artisanal Deep Sea Fishers SIGHT

SIGHT stands for 'Special Interested Group on Humanitarian Technology', which will come under the IEEE, one of the largest professional organizations in the world. The IEEE Artisanal Deep Sea Fishers SIGHT was formed in the years 2014 under IEEE Madras Section with the main objective of develop new ideas, concepts, projects, products and services with the help of existing scientific know-how, managerial efficacy and engineering expertise and along with the traditional knowledge of fishermen.

Association of Deep Sea Going Artisanal Fishermen

ADSGAF was formed with the support of SIFFS in the year 1992 exclusively to promote fishing and related activities of deep sea fishermen of the Thoothoor region of Kanyakumari District, Tamil Nadu. ADSGAF is working with the deep sea fishermen in promoting sustainable fisheries for their socio-economic development and

mainstreaming environment protection with development activities. It is also into the creation of a participatory approach towards saving our environment and building local stewardship to address global challenges like climate change. It has 340 full-time members. There are around 3000 fish workers and their dependents associated with the organization.

South Indian Federation of Fishermen Societies

Owing to its genesis in the early eighties, the South Indian Federation of Fishermen Societies (SIFFS) is a leading non-governmental fisher community managed, controlled and governed organization in marine artisanal fisheries functioning on cooperative principles. It functions as the apex body of over 180 primary fish marketing societies of artisanal fishermen in the maritime states of Tamil Nadu, Puducherry, Kerala and Andhra Pradesh in India, which are affiliated to District Federations that are the members of SIFFS. The village-level primary societies take care of the local fish marketing, credit and saving needs of over 8500 fishing units which benefit almost 50,000 fishermen. Livelihood restoration support is also provided to fish vending women. SIFFS, as the overall apex body has a wide range of activities, both commercial and developmental.

Objectives of the Consultation

- To bring out appropriate Boat Designs and Boat Models to minimize accidents at sea;
- To evaluate the problems involved in boat building;
- To assess the responsibility of various stakeholders who are involving in boat design and boat building; and
- To arrive at a good model and share the process documentation with the Government of India and other coastal states.

Date and Venue

The consultation was held from 29th to 30th July 2015. It was held at the Koodal Hall, Institute of Ocean Management, Anna University, Chennai, India

Design

There were 7 sessions in the two day consultation. Introduction, Technical session and problem evaluation were part of the first day's programme. Demonstration, thematic session and conclusion were organized on the second day. All sessions were chaired and co-chaired by experts and attended by a wide range of professionals.

Fishing Vessel L. ASTER has been selected for National SAR Award
Special Mention in the meeting

A special event was also organized to recognize the brave SAR efforts of the Artisanal Deep Sea Fishing Boat "L. Aster" owned by Mr. Lourdayyan S/o Mr. Thobiyas, Chinnathurai of Kanyakumari District for saving the lives of 10 crew members at sea. Dr. E. Vivekanandan, former Principal Scientist, CMFRI presented him a Ponnadai and Dr. Anrose, Former Zonal Director, FSI gave a Certificate of Appreciation to Mr. Lourdayyan.

Session-1

**Chaired by: Dr. Y. S. Yadava, Director
Bay of Bengal Programme Inter Governmental Organization**

The consultation began with a silent prayer to give tribute to our beloved former President of India Shri. ABDUL KALAM followed by the welcome address. Mr. J. Vincent Jain welcomed the participants and the dignitaries.

Mr. Jain said that there are more than 600 boats of various sizes owned by the Artisanal Deep Sea Fishers of Thoothoor area of Kanyakumari District that are operating in the entire coast of India and also beyond Indian waters. Many times their boats suffer structural damages due to poor boat design and dubious quality materials used for building boats, poor facilities, and other navigation and safety issues.

Mr. Jain also said that out of 365 days in a year, these fishermen spend about 250 days at sea. Their boats are their shelters. They don't have any entertainment. In a small boat like 50 to 65 feet length there will be 12 fishermen working in cramped conditions without proper resting place and sufficient lighting.

Bringing out efficient and safe 'Boat Designs and Boat Models' to match the demand of Artisanal Deep Sea Fishers is a long cherished need. That is the reason for organizing this consultation.

Presidential Address by Dr Y S Yadava

Dr Yadava thanked the organisers of the workshop and said this was the first of its kind in the country and congratulated Mr Vincent Jain and team for the initiative.

He said that boat building has been a century old tradition in India and some indigenous boat designs are excellent and highly seaworthy. However, with the advent of technology, availability of many other boat building materials and the fact that fishers now travel long distances in pursuit of fish, there is a need to have a fresh look at these designs as also the materials to be used for boat building in India.

He said, in his view, there is a need to look at two main requirements while considering options for good and safe boat designs. The first requirement is the structure of the boat, which has to provide the required stability as also be seaworthy. The second is the layout, which need to be as per the requirements of the fishing gear to be deployed in the boat. The layout also need to ensure that the area available, both on the deck and also below the deck, is put to most efficient use.

Dr. Yadava said that the fishing boat building sector in the country is highly un-organized. The need for bringing standards in boat designs as well as construction has never been greater than now. While many aspects of boat building processes are already incorporated into the Bureau of Indian Standards (BIS) but many are yet to be introduced as standards. Further, the boat building yards need to be registered in the country and their standards should also be laid down.

He said, in our neighboring country Sri Lanka, one can see very well designed multi-day fishing boats. In fishing boat building category, Sri Lanka is almost two generations ahead of us. In Sri Lanka, all boatyards are registered. Most Sri Lankan boatyards are temperature controlled (air conditioned), which is presumably good for FRP boat building. He said that it was the Bay of Bengal Programme (BOBP) that set up one of first modern boat building yards in Sri Lanka in the mid-1980s and also introduced fibre-reinforced plastic (FRP) as a boat building material in the region around the same time. In comparison to the Sri Lankan boats, the Indian boats are poorly designed as also the quality of construction is unsatisfactory. Even the 600 odd deep-sea fishing boats of the

Association of Deep Sea Going Artisanal Fishermen (ADSGAF) are poorly designed and constructed.

He said he would also like to clarify that the Food and Agriculture Organization (FAO) does not have standard boat designs that can be replicated for use all over the world. As conditions differ and also requirements vary, some of the FAO designs can be used as the basis for making your own designs. However, FAO does have standard boat building practices and such practices should be incorporated in construction of the boat building yard as also boat building. It is also important to use the services of qualified naval architects and also learn from fishers and indigenous boat builders in the country.

Dr. Yadava said that boat designing, constructing prototypes and putting them to test in open seas is an arduous task and involves time, energy and money. The Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) undertook building of a prototype of 30 footer FRP open deck beach landing boat. One of the former BOBP boat building Consultants, Mr O Gulbrandsen, a naval architect from Norway, was hired to work with 15 boat builders from Andhra Pradesh. It took Mr Gulbrandsen three months to accomplish the work and in the process also trained the boat builders. Based on the work, the BOBP-IGO has also brought out a Training Manual on 'Construction of FRP Beach Landing Boats'. It gives a step- by- step guide on the construction process.

He concluded by congratulating ADSGAF for initiating discussions on this important topic. The outputs of this important workshop should be brought to the notice of the Central Government and the coastal State Governments so that the matter can be further progressed and India can also start building quality fishing boats. He wished the deliberations all success.

Inauguration

Dr. L Ramalingam, Zonal Director FSI, Government of India

The consultation was inaugurated by Dr. L Ramalingam. In his inaugural address he acknowledged his appreciation to the fishermen group who are voluntarily coming up with such a meaningful initiation, demanding for a safe design. He said that we need efficient and good structural design for the boats and it will eliminate accidents at sea to some extent. He also said that he was nominated by the Joint Secretary-Fisheries, MoAHD & F, Government of India to attend this consultation and send the recommendations of the consultation.

He said they have come here to listen to what fishers have to say about boat building, what their requirements and needs are and submit it to the Ministry. That is why they have decided to spend the whole day here. He said they are fully aware that this process requires many more such consultations and meetings and very little can be achieved today but we must take this ahead in the same spirit. He added that Mr. Vincent Jain and his team has done a wonderful job.

Dr. Leela Edwin, Principal Scientist and Head-Craft and Gear Division CIFT, Government of India

Dr. Leela Edwin delivered the Keynote address. She said that the ADSGAF has been associated with us for a couple of projects and their contribution to the sector is notable. She appreciated Mr. Vincent Jain that he is able to organize this consultation with the combination of necessary experts like Naval Architects, Boat Builders, Maritime Academicians, Scientists, Technocrats, etc. She said that though she is not a Naval Architect, she could tell that we have to give importance from the boat design, selection of boat building materials, quality of boat builders.

She also made a presentation on "Safety and Energy Efficiency of Fishing Vessels"

Highlights of her Presentation

There are 38.3 Million people and 4.36 million vessels are engaged in the capture fisheries in world.

Efforts at addressing safety at sea

A joint Initiative by IMO, ILO and FAO had been established to address the safety of fishing vessels and fishermen at the international level. They jointly contributed their expertise in respective areas of competence to develop safety recommendations.

FAO: Fisheries in General (which includes areas such as safety in fishing operations and the relationships between fisheries management and safety at sea)

ILO: Labour in fishing Industry

IMO: Safety of Life, Vessel and Equipment at sea.

Safety recommendations for fishing crafts provide information on following areas with a view to promote safety of vessels and safety and health of fishermen.

1. Construction, water tight integrity and equipment.
2. Stability and sea worthiness.
3. Machinery and electrical installation.
4. Life saving appliances, fire protection and firefighting.
5. Crew accommodation and protection of crew.
6. Radio communications and Navigational Equipments.
7. Manning training and competence.
8. Emergency procedures and safety manning

CIFT has developed and introduced 12 standard + designs of mechanized wooden fishing boats in the size range of 7.6 to 15.2 m LOA for coastal and intermediate range. It is estimated that over 80% of the nearly 54,000 mechanized wooden fishing crafts in the Indian fishing fleet confirm to the popular CIFT designs or its later adaptations.

Special Address

H.R. Mohan, Vice Chairman IEEE Madras Section

Mr. H.R. Mohan delivered the special address. He said that IEEE Artisanal Deep Sea Fishers SIGHT is a new domain in IEEE, which is formed by the fishers. IEEE objective is to empower weaker sections. He said they are dedicated to support the quality of life of underprivileged people. IEEE has a mission to do humanitarian work in fisheries and some of the goals are developing/augmenting appropriate technologies, support business models of successful and scalable technology solutions, increasing awareness of technology and applying its potential to improve quality of life of the underprivileged.

Dr. Vijay Kumar Yaragal, Deputy Director MPEDA, Government of India

Dr Vijay Kumar said that during the last two to three years we have been trying to put some toilets on board fishing vessels. We have apprehensions on the stability part, if we bring toilets from outside and also in some states fishers have superstitious beliefs that this would hamper their work. Fishers say they do not have enough fresh water on board to maintain the toilets. These are the constraints we face so all these aspects have to be factored in before when we design a boat. Our boatyards are not bad but still there is

scope for improvement. Sri Lanka has excellent boatyards. Some vessels brought from Sri Lanka to Vizag were very well designed. In Andhra Pradesh we noticed Sri Lankan fishers were better in catching fish than our fishermen. We must find out why they are better fishermen. I am thankful to Mr Vincent Jain for initiating this process, which will continue for many years. I sincerely wish that we will get boat designs.

**Dr. E. Vivekanandan, Former Principal Scientist
Consultant, CMFRI, Government of India**

Dr. E. Vivekanandan said that even though he was not very familiar with the technical aspects of boat building or design, he was fully aware of Mr Vincent Jain of AD SGAF and his team and their capabilities to take this initiative ahead. He also requested everybody to support this initiative.

He said that this is an important gathering of professionals, technicians and experts from many disciplines connected to fisheries. And that he was glad to see people with this much of diverse expertise in this meeting. This meeting need not be only about boat design. This can be a package of affiliated requirements - better facilities at fishing harbors, better berthing facilities, etc. So the two days here are very important because the recommendations of this meeting will be taken up to Joint Secretary level in the government, as Dr Ramalingam said. He requested the experts who have assembled here to participate fully in this consultation and recommend specific ways to address the issue of designing and constructing safe boats. He added that perhaps, identifying a task force to take the message further to the government for a follow up action may be an effective way of moving forward.

He wished the workshop all success.

**Mr. Karikalan, Trustee
AMET University**

Mr Karikalan said that AMET University is India's first Deemed University in Maritime Education. The University is offering nearly 40 courses including, UG, PG, MPhil, Ph.D and Diploma courses with international standards. The courses are approved by Directorate General of Shipping and University Grants Commission. Since its inception AMET has catered to the training and development of numerous international students from Angola, Nigeria, Yemen, Syria, Dubai, Iran, and Djibouti, Sri Lanka, Egypt, Kenya.

He is happy to be part of the initiative taken by the fishermen with view of building a safe shelter at sea as they are actually living in the sea. AMET University is having experts and expertise to meet the requirements of Artisanal Deep Sea Fishers. The university is happy to join with AD SGAF to engage in research in boat building and other related activities.

**Mr. G. Venkata Rao, Assistant Director-Fisheries
Government of Andhra Pradesh**

Mr Venkata Rao said that there are 30,600 boats in Andhra Pradesh out of which traditional boats are 14,720, moderate boats 14,016, and mechanized boats are 1830. They are registering all the boats under Merchant Shipping Act and issuing seaworthiness certificates. But they are not observing how these boats are constructed, what is their stability, what equipment is available in the boats. A fisheries corporation was registered some years back and they constructed a few boats and later it was shut down due to some reasons. The existing boatyards are constructing in their own way and not to any approved standards. He added that due to this so many accidents are happening in AP. He said that this kind of workshop is very useful and hope that more such workshops will be conducted in AP. They are very useful to fishermen and will enhance their livelihood too.

**Mr. Hashim Al Kiyumi, Chairman
FTI Group of Companies**

He said that he has already met few of the artisanal deep sea fishers of Thoothoor and this is his second meeting with them along with many scientists, student engineers, boat builders and government officials. He said his company is interested in developing Oman deep sea fishing and he is also interested in collaborating with the AD SGAF. Already few of the AD SGAF members visited Oman for exploring the possibilities of the areas where they can collaborate. Since oil prices have dropped, our government is seeking to revive the economy by focusing on potential industries like fishing. He said that they met the Under Secretary of the Ministry of Agriculture, shared the vision and requested him to provide more facilities in fishing harbours. This year they are taking 8 boats to Oman to do deep sea fishing in Oman and during the coming 5 consecutive years they are planning to take 250 plus boats to Oman. So the artisanal deep sea fishers need good quality boats and he hoped this consultation would fetch the expected outcome.

Session-2

**Chaired by: Dr. Anrose, Former Zonal Director
FSI, Department of AHD&F, Ministry of Agriculture, Government of India**

Dr. Anrose said that in India, boat designs are indigenous and developed by fishers with their special needs in mind without outside inputs. That is the reason one can see so many variations in the sizes and designs of boats in each maritime state. He added that the FAO has studied all our indigenous boat designs and come out with recommendations. They have not introduced any new designs - they only modified and improved on existing indigenous designs. For Thoothoor fishers, the boat has to be specifically designed for the nature of their work, the fishing method/s they use. The boat's design has to focus on the type of fishing. A boat designed for trawling will not be able to do gill net operations efficiently. Besides the fishing method, other factors like the location of fish hold and carrying capacity, how much ice to be carried, endurance etc. also have to be taken into account. Then comes the selection of a suitable material for building the boat's structure. Wood has been used historically but now wood is scarce so we need to find new material to build boats. He said he was project officer in a Govt. approved boat yard from 1976 to 1981. From wood they changed over to FRP and there were two sets of training organized, one in IIT, on FRP. The tsunami boats were bad not due to design issues. They were bad because of poor quality material like cheap fillers to achieve thickness instead of the more expensive fiber glass. Under a fisheries project they brought a gill netter-cum-trawler from Sri Lanka and using that as a model we developed moulds. This effort and other details like fuel efficiency was published in the Economic Times in 1986. All the designs and data are available in the public domain but they are not suitable for artisanal deep sea fishers because they do long lining. He said that we have to design boats specifically to the requirements of fishers and the nature of their fishing. He added that our boat construction is not satisfactory. He said that a vessel's propeller shaft had broken at sea and their FSI vessel was towing and the entire stem of the tow came off. This is how our local yards build boats. He said that we have to ensure the strength of the frames. The boat should be able to withstand rough seas as Thoothoor fishers would never turn their backs on rough seas. A boat supports the fishers' lives and livelihoods, in fact a single boat provides livelihood to several families. So a good, safe design and construction is mandatory.

**Mr. Dattaraj Nichnolkar and Team
DAIB Core Materials P LTD**

Highlights of the presentation

To realize the full benefits for your application, all of DIAB's materials can be delivered in ready-made engineered kits to significantly reduce cost and optimize efficiency throughout the manufacturing cycle.

Composite materials are formed by combining 2 or more materials. Modern composites use typically Carbon or Glass for the fibers, and polymers such as Epoxies, Polyester, Vinyl Ester for the matrix to hold them together.

Fibers are principal load carrying element – continuous, long, oriented fibres’.

1. Resin matrix distributes loads between fibers
2. Supports and protects fibers; spreads loads between fibers.

Different options for combining the fibers and the resin together:

1. Wet lamination
2. Wet lamination with vacuum consolidation
3. Infusion
4. Pre-impregnation under vacuum
5. Pre-impregnation in autoclave

Advantages of Sandwich composites:

1. Light and strong
2. Significantly reduce weight and increase stiffness while still maintaining strength
3. Freedom of design
4. Freedom to adapt both form and function to specific application needs
5. Improved production, performance and productivity
6. Excellent strength-to-weight ratio gives higher speed, longer range, greater payload capacity and reduced power demand
7. Excellent performance over time

Segments where sandwich technology is in use:

Wind
Marine
Transportation
Industry
Aerospace

Mr.Toms Jacob, Naval Architect
International Shipping Bureau (ISB)

Fishing Boat Design Conforming to FAO Standards

Highlights of the Presentation

Advantages of using naval architects in designing fishing boats

1. To ensure that the boat design conforms to international standards and local body/certifying authority rules and regulations.
2. To ensure that boat has adequate stability and hull strength for the intended purpose.
3. To develop an optimised hull design so as to ensure that the boat achieves the required service speed and to reduce/optimize power requirements to achieve service speed thereby reducing fuel consumption rates.
4. To assure that the safety aspects of the boat design meets international standards and local body/certifying authority safety regulations.
5. To develop unique, innovative and stand-alone boat hull design.

Basic Design of a Fishing Boat from a Naval Architect’s Perspective

Some of the major factors that needs to be considered prior to developing the basic design of a fishing boat is mentioned below:

1. Intended service route of the fishing boat

2. Geographical and climatic characteristics of the fishing area
3. Fishing gear and methods that will be utilised on-board the fishing boat
4. Seaworthiness of the boat and safety of the crew
5. Handling methods, processing and stowage of catch
6. Guidelines and standards applicable to fishing boat design, construction and equipment
7. Choice and availability of construction materials
8. Economic viability

Design & Safety Aspects of a Fishing Boat to Meet FAO Standards

FAO, IMO, ILO are working under the framework of United Nations and have jointly developed guidelines and codes to ensure and enhance the safety of fishing boats/vessels at sea. The international codes and standards currently in place for fishing boats/vessels are:

- (a) The Code of Safety for Fisherman and Fishing Vessels
- (b) The Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels
- (c) Safety Recommendations for Decked Fishing Vessels of Less Than 12 m in Length and Undecked Fishing Vessels

The various design and safety aspects covered under the codes and guidelines are:

1. Construction, Watertight Integrity & Equipment
2. Stability and Seaworthiness
3. Machinery & Electrical Installations
4. Fire Protection, Fire Detection, Fire Extinction and Fire Fighting
5. Protection of the Crew
6. Life Saving Appliances and Arrangements
7. Emergency Procedures, Musters & Drills
8. Radio Communications
9. Navigational Equipments & Arrangements
10. Crew Accommodation

Conclusion:

In essence, the following plans and documents needs to be developed during the design and construction stage of a fishing boat to build it as per FAO standards

1. Watertight and Weather-tight Arrangement Plan
2. Stability Booklet
3. Lifesaving and Firefighting Systems Arrangement Plan
4. Structural Fire Protection Plan
5. Navigational Lights Arrangement Plan
6. Accommodation Arrangement Plan
7. Electrical Systems Line Diagrams
8. Boat Operating Manual
9. Manual describing Emergency Procedures

The guidelines for fishing boats/vessels developed by FAO, IMO & ILO pertaining to fishing boats/vessels are comprehensive, detailed and very generic in nature. It is proposed that local/regional governing bodies/authorities, fishing boat builders, fishing vessel owners and naval architectural firms should work together to look into the design and safety aspects outlined in the Codes and develop a regulatory framework based on the applicable requirements from the Code pertinent to the region and operational areas to enhance the safety, design, construction and equipment standards of fishing boats constructed and operated in the region.

**Mr. Renju. N, Naval Architect
International Shipping Bureau (ISB)**

“Classification and Survey of Fishing Boats”

Highlights of the presentation

International Register of Shipping (IRS), as a classification Society with a global network of professional engineers, naval architects and qualified surveyors, can provide comprehensive and integrated services to the fishing boat industry.

Classification of Fishing Boats as per internationally recognized IRS Rules and regulations and also conforming to applicable local governing body standards and regulations

1. Certification of marine components and fishing gear on-board fishing boats.
2. Third party inspection services for industrial components as per various National and International Standards as well as customer specifications.
3. Training and Certification of crew/serangs with regard to boat handling, weather, etc.

IRS has conducted detailed studies about the main risks associated with fishing boats. They include lack of watertight sub-divisions and integrity, shifting loads, heavy nets, flooding, fires, equipment failure, etc. These are all addressed in our rules.

It implies a process of verifying boat design standards and safety aspects against a set of requirements. The requirements are laid down in the rules established by the Classification Society.

Classification implies an activity, in which the boat is surveyed during construction on the basis of design approval, tested before being taken into service, and surveyed regularly during its whole operational life until it is scrapped. The aim is to verify that the required rule standard is built in, observed and maintained.

We fully understand that time and boat performance is money for a fishing boat, so a clear priority will be ensured to make sure the classification process is as effective, yet as unobtrusive as possible.

**Mr. K. Nanda Kumar, CEO
Elektronik Lab, Chennai**

“Importance of Tracking, Navigation and Communication”

1. Legacy communication like VHF & SSB
2. New technology DSC, AIS, Sat AIS
3. Newer technology Android & iOS Apps
4. Hybrid technology combine all of the above

The Next Revolution

1. E- bridge
2. Position information/Compass
3. Speed & Course Information
4. Echo Sounder
5. Fish Finder
6. Electronic Catch Records
7. ECS/AIS
8. Emails (GPRS/Satcom needed)
9. E-log book
10. ROR training materials

11. Plankton concentration info
12. Underwater current & temp
13. Weather information

Issues Faced by Fishers in India

1. Technology readily available to enhance fishermen safety
2. Govt. of India needs to have a major mindset change
3. Legal use of VHF- SSB are still a dream for many fishermen
4. Licensing should be made easy – link to aadhar or voter id
5. Import duties to be reduced for marine communications - subsidy
6. Most VHF/SSB used are unlicensed
7. WPC still hiding behind an ancient Telegraphic act
8. Training for fishermen on basic communications & GMDSS
9. Training on use of digital charts

Need for Training

Most accidents have been proved to be caused by human negligence. The government should revise policies with reference to training & certification of Indian fishermen – bring in GMDSS – ECDIS – Radar/ARPA other ROR. Many fishing boats do not exhibit the proper navigation lights as required by the International Rules of the Road for Sea, nor do they abide by the International law of the Sea.

Regarding radio communications, many still use the International Distress, Safety and Calling Channel-16, for routine conversations and block this channel frequently so that at times emergency calls are not possible on this frequency.

Session-3

Chaired by: Dr. Leela Edwin, Head, Craft and Gear Division, CIFT
Co-chaired by: Mr. J. Mahiban, Al Rayan Marine Projects and K. K. Crafts
Dr. Tajuddin, Dean, College of Fisheries Engineering, Tamil Nadu Fisheries University, Nagapattinam

Open Discussion: Issues faced by artisanal deep sea fishers

Dr. Leela Edwin said that Mr. Vincent Jain rightly said in his welcome speech that for Artisanal Deep Sea Fishers their boats are their shelters. Most of the days in a year, they are at sea. A strong and safe shelter at sea is indispensable for them. Here, we have leading Naval Architects and Boat Builders, Deep Sea Fishermen Representatives, Representatives from Fishermen Organizations, Fisheries Technocrats, Experts, Engineers and Representatives from Central and State Government. Hopefully we can bring out efficient and safe boat designs to match the demand of our Artisanal Deep Sea.

During the consultation, fishermen had extensive discussions with boat builders, FRP technicians, Naval Architects, Maritime Academicians and students. They stressed the need to have approved and certified boat building yards with specifications and conditions in place for the construction, maintenance and repair of deep sea fishing boats.

Navigation and other conflicts with merchant ships, and various kinds of movements that boats developed at sea besides rolling and pitching, also came up for discussion.

Almost all the speakers agreed that safety should be high priority, and that all boats must have a lay-out that's safe and improves the efficiency of working conditions on board. The layout of the boat must keep in mind the safety, working and navigating ease, and proper handling of the catch depending on the fishing method in use.

The present designs of deep sea boats were improvised by fishers and local boatyards so

the entire design of the boat, the layout of the deck equipment and machinery spaces, storage spaces - both fuel and fish, have to reassessed and modified as required by naval architects in consultation with fishers or any appropriate, qualified certifying authority in consultation with fishers, to approved standards.

The representatives of the deep sea fishers demanded standard sizes of boats for fishing that will be an open option for choosing their boats based on their needs and buying capacity. They proposed three designs with the size of 55' 60' and 65'. The Naval Architects agreed and they also proposed for making scale-down models that can be tested.

The deep sea fishers also said they would prefer FRP hulls to steel hulls if they could be made to approved standards by certified boatyards. The dangers of any below the water damages to the hull of FRP boats were also discussed. Fishers said they need a guarantee or some kind of assurance from the classification societies or other approving bodies about FRP hull repairs carried out below the waterline. In some cases the hull cannot be repaired and may have to be replaced. So in effect, any damage to the hull below the waterline has to be assessed carefully before deciding on whether to repair or replace. However, it was agreed that such hull repairs could only be temporary.

The watertight integrity of bulkheads used in the construction of boats was also discussed and fishers were told how this design helps restrict leaks due to damages to one section of the boat and prevents flooding in the other sections.

Dr. Tajuddin said for fishers, boats are their houses at sea. He also said that as he is from an academic institution he would like to be involved in some study and that will be useful for fishermen.

30th July 2015

Session-4

Mr. Ben Jack
Sathya Bham University, Chennai

He made an appraisal of the first day of the consultation. He said that yesterday we had three lengthy sessions where everybody actively participated. We were unable to complete the open discussion and it may be continued today and we have four more sessions today. He also said that there are so many factors to be considered while building a boat and which were very well discussed yesterday. Bathymetry is another factor to be considered that will determine the design of the boat.

Mr. A. K. Choudary, MME & Head Office
CIFNET, MoAHD &F, Government of India

He spoke about the types of training courses offered at CIFNET for members of fisher communities and spoke of the need for competency in seafaring. He stressed that the training imparted at CIFNET was not text book learning but it was full of hands-on practical learning, which is highly useful for people manning fishing boats. There were dedicated vessels to provide on board training. About FRP as a material for fishing boats he warned that any hull damages below the waterline are critical and must not be ignored. Even though repairs were possible, they were of a temporary nature, he added. Fishing boats in India need standards and certifications. For that we need approved boatyards and classification societies to monitor the quality of material used in boat building. This consultation is a critical first step towards that objective.

Session-5

Chaired by: Mr. Mahiban

Co-chaired by: J. Vincent Jain, Executive, SIFFS

Mr. Mohamed Yusuf, M.E student, Seyad Ammal Engineering College, Ramnad

DAIB Core Materials PVT LTD

Demonstration: Infusion technology for Boat Building

Mr. Mahiban invited the experts Mr. Rimzath Ali and Mr. Manu Shankar from DAIB for showing the demonstration. He said that boat building is a complex and labour intensive industry. He hoped that the Infusion Technology may minimize the complexity and labour intensive problem and also fishermen need not wait for long days to get their boat finished. He recommended that a boat must be built based on diagram prepared and endorsed by authorised Naval Architects. This must be regularised by the government.

Session-6

Chaired by: Mr. R. Antony Xavier

GBC Technology Pvt Ltd, Chennai

Co-chaired by: Mr. Y. Sudheer

Indian Maritime University, Vishakapatnam

Cdr. Prashant Kumar, Ms. Ch Revathi, Mr. Gopi Krishna y, Mr. Premanandh and Mr.Srivathsan, AMET University, Chennai

Safe Boat Design for Artisanal Deep Sea Fishers

Highlights of the Presentation

OBJECTIVE OF THE DOCUMENT

The objective of the document is to design a fishing boat which shall overcome the problems presently being faced by fishermen:

- ▶ Structural damage of the boat
- ▶ Poor quality material for boat building, example poor wood
- ▶ Not sufficient layers used in FRP construction
- ▶ No safety equipment
- ▶ No space management
- ▶ Poor kitchen
- ▶ No toilet
- ▶ No sleeping place
- ▶ Length, width, draft and depth are not proportional, etc.
- ▶ Poor electrification
- ▶ No gearbox, propulsion, rudder, shaft calculations for fuel efficiency
- ▶ No proper exhaust
- ▶ No proper pipe line for cleaning the boat
- ▶ No proper navigation light

CAUSES OF ACCIDENTS

Type of accidents	Cause of accident
Collision	Human error
Grounding	Vessel ran out of fuel
Drifting	Vessel overloaded
	Entanglement of fishing gears

Fire	Other operational error
Explosion	Rudder failure
Flooding	Engine failure
Capsize, severe List	Fishing gear rope in propeller
Loss of hull integrity	Leakage water ingress
Man overboard	Structural failure
	Electrical failure
	Fuel leakage
	Other technical failure
	Act of other vessel
	Extreme weather
	Other external cause

Cited SIFFS study on Risks and Dangers in the Small-Scale Fishery of Tamil Nadu (Swamy,2009), detailed causes of accidents in the Tamil Nadu fishery.

The categories of capsizing, engine failure and surf crossing are the three major causes of accidents, covering a total of 72 percent. Most likely, the result of an accident during surf crossing is capsizing. Capsizing out at sea is often due to bad weather and lack of boat stability.

About FRP (material)
 Comparison of Ultimate Strengths
 Comparison of thickness and costs for equal strengths
 Guidelines for FRP Laminates

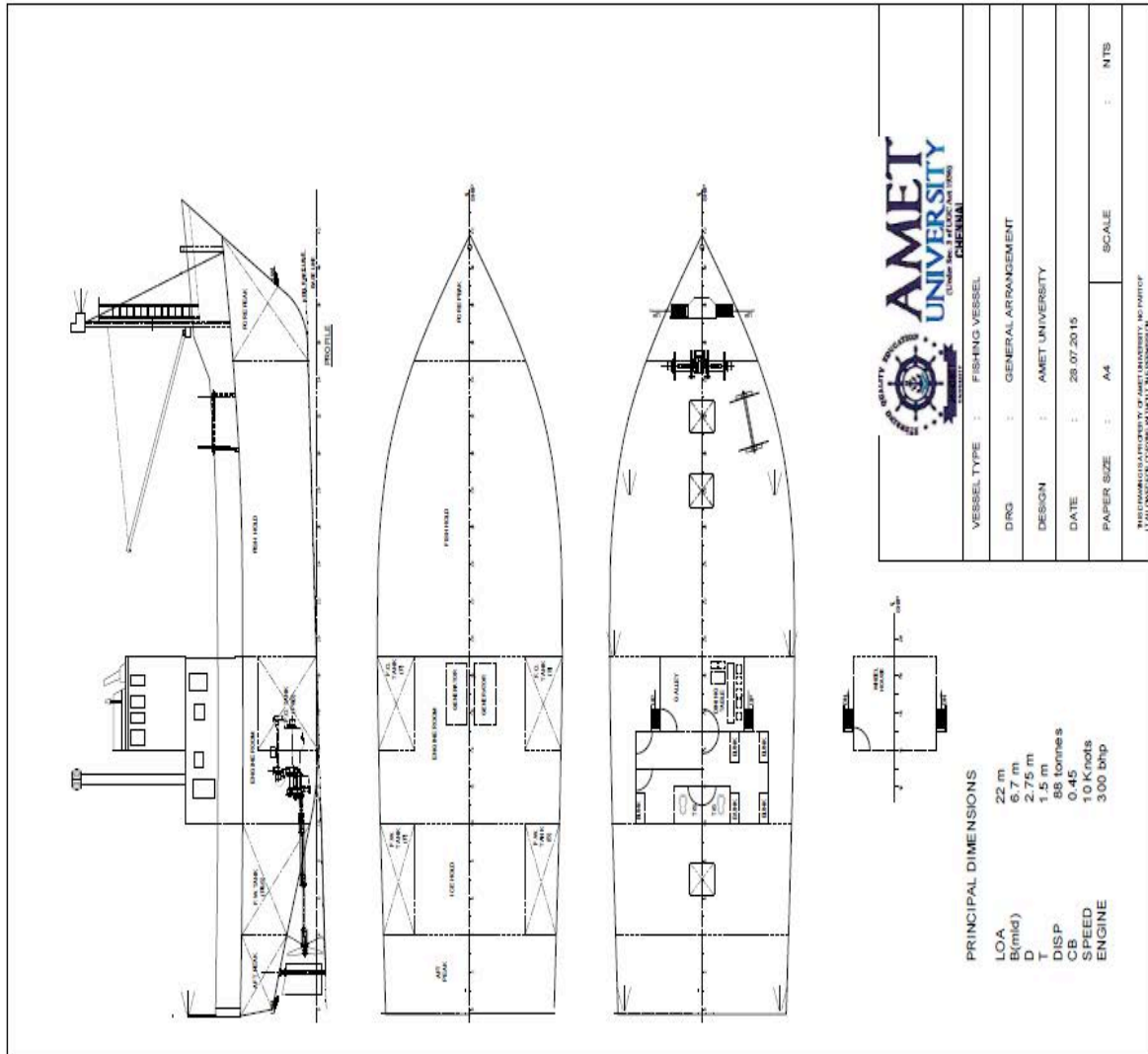
FRP Advantages

1. Less maintenance
2. No caulking, no leaks. Hulls are one continuous piece of FRP with no joints or gaps to allow water into the hull.
3. No plank shrinkage when laid up. Wooden hulls suffer from plank shrinkage when brought out of the water and laid up in the sun. FRP does not shrink or swell so leakage and re-caulking are avoided.

FRP Disadvantages:

1. Total dependence on imported materials and foreign currency availability. (This is not correct)
2. Choice of vessel fixed once design is chosen and moulds made.
3. Must retain core group of qualified technicians.
4. Fire and health hazards from chemicals.
5. Large start up investment.
 - All fishing gears and other heavy materials should be properly placed as low as possible.
 - Particularly care should be taken when pull from fishing gear might have negative effect on stability. The pull of the fishing gear should be from as low a point on the vessel above the water line as possible.
 - Automatic steering gear can be dangerous as this prevents change in course which may be needed in bad weather.
 - To prevent a shift of the fish load carried in bulk portable divisions in the holds should be properly installed

Boat Design



Prof. G. Gaswin Kastro, Dept of ECE
 Annai Vailankanni College of Engineering, Nagercoil

“Presentation on Man overboard Alert System”

Highlight of the presentation

The prototype consists of a PIR sensor which monitors the infrared radiation (IR) in the environment. If there is any change in IR radiation level it senses the change. Human body naturally emits infrared radiation. The PIR sensor contains a Pyroelectric crystal which is sensitive to such radiations. We should set this PIR sensor at the sides of boat so that when a man falls off the boat he will cross the monitoring area of the sensor. The IR level will change and this change will be sensed by the PIR sensor.

The sensor will give this signal to a micro controller. A Piezo Buzzer and LED will be connected to the micro controller. At once the signal from PIR is sensed, the micro controller will activate this Piezo Buzzer and LED. The Piezo Buzzer will generate an alarm and an LED will give light signal which will in turn alert the crew members so they

can take immediate action. The sensitivity and monitoring angle of the PIR sensor can be adjusted according to the hull design of boats.

Session-7

**Chaired by: Dr. Ramalingam, Zonal Director
FSI, Department of AHD&F, Ministry of Agriculture
Government of India**

**Co-chaired by: 1. Mr. G. Venkata Rao
Assistant Director, Fisheries, Government of Andhra Pradesh**

Dr. Ramalingam said that after a two day long consultation, we are in the concluding session. So many issues have emerged in the consultation which are noted and it will be presented to the appropriate authority. He said that bad construction has been the cause for several accidents at sea and it compromises on the safety of life and livelihood. Good construction, on the other hand, enables smoother onboard operations and provides better working conditions and improves efficiency.

The problems faced by the Artisanal Deep Sea Fishers are discussed in length and breadth in the consultation.

Er. Angelin Indira, (award winner for developing a project titled "An Outclassed Hexacopter Design with Specialized Robotic Arm") project coordinator proposed vote of thanks.

Recommendations

The following are the Recommendations towards safe boat design and building as proposed by the Consultation

1. Standardised and approved FRP boat designs of 55', 60', and 65' proposed.
2. Three scale down models to be made and tested in authorised centres.
3. Boat designs to be made by authorised Naval Architects
4. Boat building cost estimation to be approved by competent personnel
5. Quality of materials, construction (procedures whether as per approved plan) to be inspected and ratified
6. Extensive Research & Development to be initiated to build boats that can withstand adverse weather at sea and provide safe and clean working conditions for the fish workers
7. Modern fishing, fish finding, navigation, communication and safety equipments must be made available to fishers with subsidies and tax breaks.
8. To establish certified and approved boat yards and boat repair facilities for artisanal deep sea fishers at Thoothoor and its vicinity as there are none as of now.

Special Recommendations

1. A technical committee under the Chairmanship of Joint Secretary-Fisheries, Ministry of AHD &F, Government of India to be constituted.
2. Marketing of catch brought by artisanal deep sea fishermen may be permitted in identified harbours in the west and east coast is also an urgent need.
3. Training of fishermen in processing and quality control of catch
4. Certification of fishermen by authorised agency of Government of India
5. Provide training to fishermen on watch keeping and crew discipline

Conclusion

Despite the availability of high quality boat building materials and technologies, there are no standards for fishing boat designs and building guidelines in the country. This compromises safety and endangers the lives and livelihoods of artisanal deep sea fishers. The need for standards in boat building and design has never been greater. Due to scarcity of inshore resources, fishers now go longer distances into the sea in search of fish and spend more days out at sea. This consultation is the first of its kind in India to address this issue directly with the active participation of artisanal deep sea fishers. It offered fishers a platform to interact with scientists, naval architects, FRP technicians, students from maritime and other universities. This consultation also proved the necessity to involve fishers at all levels of the boat building process so that the special needs of each type of fishing technique can be applied at building and design level. We hope to take this process to the next level at the earliest.

