

Small Vessel Safety and Sustainable Coastal Development

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Making fishing vessels safer is one of the most fundamental measures to improve sea safety. But most international legislation to ensure sea safety relates to vessels larger than 24 meter (m). Vessels under 12 m are not covered by any international legislation – and are very often outside the pale of national regulations as well.

Safety at sea is frequently discussed at SIDA-funded training programs dealing with “Sustainable Coastal Development and Maritime Safety Management,” conducted every year. This paper is an experience-based rather than a technical discussion of safety at sea for small fishing vessels. It applies SSPA’s experiences from 15 years of engagement in international multidisciplinary coastal zone development programmes in different parts of the world.

The paper discusses both a top-down and a bottom-up approach to improved safety of small fishing vessels – which would encourage and ensure sustainable coastal development. The paper provides impressions, lessons and recommendations concerning the design and operation of fishing vessels, institutional requirements for sea safety, search-and-rescue procedures, safety training, and safety standards and regulations.

This article is based on a presentation made by Jim Sandkvist at the Third International Conference on Fishing Industry Safety and Health, Mahabalipuram, Chennai, 1-4 February 2006.

Fishing fleet

The world’s fishing fleet has almost doubled over the last 25 years. In 1995, the fleet consisted of about 3.6 million vessels. Two-thirds of the vessels were undecked; vessels generally less than 12m in length. (FAO Fisheries Circulation No. 966 and *Bulletin of fishery statistics 35, Fishery fleet statistics, FAO, 1998.*)

The fishing fleet often consists of small boats and canoes. These are central to the family and the local economy in coastal municipalities and communities. But small vessels (under 12m in length) used for fishing and transportation figure prominently in accident statistics – worldwide but particularly in developing countries.



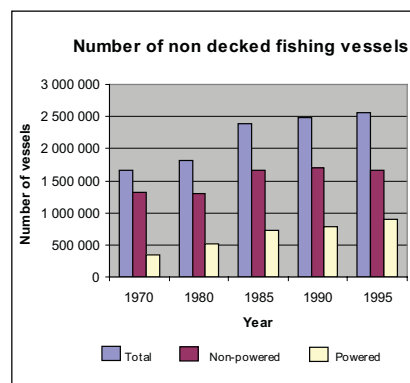
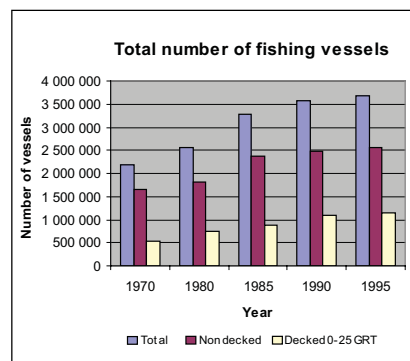
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A multi-disciplinary approach

Improving fishermen’s safety at sea requires a multidisciplinary approach and the efforts of stakeholders at various levels. National and international regulations must be followed, local awareness must be raised, financial support provided to fishermen and boat owners, fish handling quality must be improved.

Regulations and guidelines for small vessels

Maritime authorities are normally responsible for registering large vessels, but very often, small vessels (smaller than 12 or 24 meters) come under the domain of fisheries. It is suggested that national regulations and guidelines should be established for design, construction and equipment of small vessels. A system for inspections to follow up the regulations should also be established. The regulations should be adapted to local conditions and



should be practical, so that they can be implemented.

A vessel classification system should be in place. It should include different categories of vessels, operational standards and categories. It should specify design criteria by size, loading capacity, the maximum or minimum number of persons that can board the vessel, It should state whether the vessel can be fitted with an engine. If yes, what should be the maximum power of the engine. There should be guidelines for emergency and safety equipment, such as fire fighters, life jackets, life rafts, radio, compass, sea charts, etc.

Fisheries Authorities

The fisheries authority is responsible for sustainable development of the fishing industry and for protecting the marine resource. Catches are regulated through different quota systems such as “total allowable catch” and different types of individual quotas. Different zoning systems could be introduced to separate artisanal fishing from industrialised trawling. (See *Risk and dangers in small-scale fisheries, ILO 2000; The state of world fisheries and aquaculture, FAO; Safety at sea as an integral part of fisheries management; FAO Fisheries Circular No 966 (2001)*).

Coast Guard and/ or Navy

The Coast Guard and the Navy are other maritime authorities responsible for safety at sea. In several countries, they take primary responsibility for search and rescue (SAR) work when vessels or fishermen are missing at sea. The work is often undertaken in co-operation with voluntary SAR organisations.

Rescue services organisations or fire brigades

Rescue services organisations or fire brigades go into action for near-shore rescue work, while the Coast Guard and the Navy take care of rescue operations further offshore.



NGOs and volunteers

In developed countries, where search and rescue are well organised, NGOs have an important role to play. NGOs and local voluntary organisations should be encouraged in developing countries as well. Since they know local conditions well, they are capable of rapid response.

Port authorities

Most small vessels land their catches on the beach or in harbours or ports. The port authorities are responsible for monitoring and control of the landed catch. Port authorities could also measure catches if a quota system is introduced.

Meteorological services

Weather-related accidents are common everywhere, as FAO statistics bear out. Reliable weather forecasts are therefore crucial for safety at sea, and early warning systems are necessary, particularly in places vulnerable to cyclones and hurricanes. These are organized in some countries by meteorological institutes.

Boatbuilders and designers

A fishing boat often retains a certain buoyancy even if flooded with water, even if it turns turtle after an accident. It then serves as a floating device for its occupants. Local designers and boatbuilders must be trained in incorporating such safety

features. Their choice of boat design, construction materials and fish handling methods is usually based on tradition, and on access to cheap and renewable materials. The co-operation of boatbuilders and designers is essential to make boats better and safer, and to introduce new regulations.

Families

The wives and children of seamen and fishermen ought to be as aware of occupational safety as the men themselves. The family plays a vital role in reducing accidents. Families' concerns for the safety of fishermen, and their strong stake in such safety, are factors that should be utilized to lower accidents and accident risks at sea.

The local community and the local economy depend on the family. So do co-operatives, local NGOs and small firms.

Safety training should be imparted early in school, particularly in coastal areas. The long-term effects would be invaluable.

The boat owner and the crew

The boat owner should be responsible for the safety of his crew, and for the vessel being in good condition. It should be registered with the relevant national authority for use as a fishing or transportation boat. It should fulfil criteria for stability and loading capacity.



The boat owner or captain is expected to:

- ensure that the vessel is in good condition and registered according to the rules.
- be responsible for the vessel being manned only with well trained and skilled crew;
- be responsible for the safety equipment on board the vessel being in good working condition.
- be responsible for the navigation equipment being in sound working order;
- be responsible for the fishing gear or other gear onboard the boat;
- ensure that the vessel is not overloaded with fish catch, goods, or passengers;
- ensure that the vessel does not go out in bad weather or when storms or cyclones are forecast.

A frequent cause of accidents is that the crew lack training.

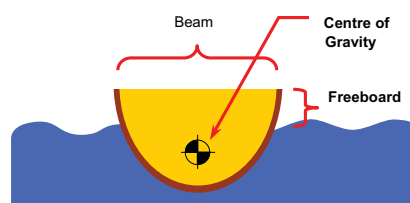
All crew members should know to swim. They should be well-trained in vessel handling and gear-handling in good or bad weather, also in handling safety equipment in bad weather. The crew should be well-versed in vessel stability, should know where to place catch, goods, or passengers for the best stability. The crew must be aware of the vessel's loading capacity and act

accordingly, in relation to fish catch, goods, and passengers.

The crew must keep abreast of weather forecasts. It should stay ashore if weather conditions worsen.

The safety of fishing vessels depends to a large extent on their technical standards and on how they are operated. Safe design supports safe handling. Choice of construction material and good maintenance are vital.

A system of boat classification in accordance with their stability and seaworthiness is essential. However, in many countries, there is no register or classifying system for small vessels.



Stability

The stability of a boat is its ability to withstand heeling and to resist capsizing.

Important parameters in this context:

- Vertical centre of gravity
- Beam
- Freeboard
- Free surface area

To ensure sound stability, the boat should have a low vertical centre of gravity. This will happen if the entire load is stowed low in the boat. The load includes fishing equipment, food, tanks, catch, etc.

A larger beam, and to a certain extent a larger freeboard, helps ensure stability. Large free surfaces endanger stability. "Free surfaces" include half-loaded tanks, bilge water and loosely stowed catch. It is very important to keep the free surfaces to a minimum.

Capability to stay afloat is another important property. This is achieved by two factors – good stability, and watertight compartments or other devices for buoyancy,

The stability can be tested in safe areas (preferably near the shore) and with the boat dry and without load. While in this condition, the boat shall fulfill the following:

- With all crew members sitting on the same gunwale, the boat shall withstand capsizing.
- In this condition, the boat shall also have enough freeboard so that no water enters the boat from the side.

A boat that does not meet these two criteria should be modified to meet them. Outriggers would considerably increase stability.

Traditional outrigger construction, Tanzania.

One criterion for buoyancy is that the boat should not sink with all crew members standing in the boat when completely swamped. Wood is a good construction material for buoyancy. The rib collars would make the boat unsinkable besides improving its stability. A watertight compartment can be built in. A floating element such as foam plastic can be arranged inside the hull. The floating elements could be combined with a fixed ice box in a fishing vessel.

Free surfaces should be avoided – by keeping bilge water away, dividing large tanks into smaller



- Dispersal of small boats along the coast enables widespread fish supplies, often without the additional cost of road transport increasing the cost of distribution.
- No slipways needed for servicing. Therefore inexpensive to maintain. Dugout canoes require no caulking.
- Local skills and local materials are used in their construction, thus providing local employment.

Traditional wooden boat built on the beach in Tanzania.

- Small boats are traditionally so constructed that they remain afloat if they capsize. The fisherman regards his small boat as his “life raft”.
- Small boats are able to operate in very shallow areas.
- Often indispensable in places inundated by floods.
- Can be propelled by oar in the event of engine failure.
- These boats can be constructed on the beach. No centralized boatyard or expensive equipment needed.
- Are adaptable to various types of fishing gear, e.g. hook and line, longline, multiple-trolling rig, gillnet, cast net, beach seine, fish traps, small shrimp trawl.
- When not in operation, they require no hurricane shelter in areas which are subject to such phenomena. In such an emergency they can be weighted with sand or hauled into safe areas.
- Since they are taken out of the water daily, damage through marine borers is avoided.
- Fishermen can be in daily contact with family and friends.
- Improvements to such craft should focus on actions that can improve stability and floatability.

Most traditional boats have evolved and refined over a long period. Today some of them get fitted with large engines – though they were

tanks, dividing the catch into smaller portions, etc.

Construction

Small locally manufactured boats have their own traditional hull forms based on local fishing techniques, sea conditions and construction materials.

Owners and users of small traditional fishing boats like *bankas* and dugout canoes should be aware of their advantages as well as disadvantages.

- Small boats are open and therefore not quite convenient for sleeping or cooking facilities.
- The crew are exposed to sun and rain.
- Not adaptable to use of large and heavy fishing gear.
- Usually not adaptable to most

kinds of mechanically operated fishing equipment.

- Not very durable.
- Weather-sensitive.
- Being open, they must usually return to base daily.
- Fish-holding capacity is limited.

The use of smaller fishing vessels also means the following:

- Low cost.
- No harbour or special installations are required, they can be hauled up the beaches along the coast.
- The fisherman can live in the proximity of the coast adjacent to berthing areas and therefore remains in rural surroundings, instead of migrating to towns and causing housing and other social problems.





not designed for such engines – and go further offshore. Sometimes new materials are introduced to “modernize” the vessels without changing the vessel’s design and construction.

The boat should be made unsinkable, through wooden construction or through watertight chambers in plastic and metal boats. If the boat capsizes, it acts as a life buoy. Most traditional boats are made of wood and will float after an accident. However, new boats based on traditional models but without watertight chambers will not float, and cannot act as life buoys.

The introduction of modern construction materials such as fiberglass, plastic and even plywood, provides opportunities to increase the boat size, change design and bring in new substitutes for traditional materials. However, if not used in a safe manner, these new materials may lead to severe consequences. Fiberglass and plastics considerably change the buoyancy of a water-filled boat. The boat may sink. On the other hand, proper use of fiberglass will modernize the design and improve safety.

The use of modern construction materials and their implications for safety, further strengthen the need for training, safety awareness and control.

An integrated approach to safety at sea.

To improve safety at sea, an integrated approach is required.

Regulations and inspections should focus on awareness, support and safety improvement measures, to be implemented in close cooperation with local authorities and stakeholders.

Small fishing vessels do not usually generate enough income for investments in safety measures such as life vests or GPS. The income is sufficient only for every-day sustenance.

The local fisherman needs ownership and control of his boat. Very often, he rents the boat from a local owner, and boat safety depends on the owner. The fact that rents have to be paid regularly sometimes makes fishermen go out even in bad weather.

Micro-financing mechanisms should be considered to support fishermen or groups of fishermen in investments in safer boats. Such investments call for exposure to larger markets with better income opportunities. The development of the local fishery industry is a vital part of coastal zone development in many developing countries.

Insurance schemes need to be introduced for poor communities engaged in small-scale fisheries. The FAO has discussed the possibility of community-based insurance schemes for fisher groups in Africa. The outcome of this initiative is not known.

The system in some West African countries is that fishermen form interest groups. Every fisherman contributes a small monthly fee to a mutual aid fund. In the event of an accident, whatever be the need – assistance for widows, a funeral, vessel replacement, hospital care for an injured fisherman — money is made available from the mutual fund.

Recommendations

The safety of small fishing vessels is a subject that has aroused great interest in various international fora. Recommendations for future work have been made in the Chennai Declaration of 2001 and the

SEAFDEC recommendations of 2003. The latter are listed below:

- Leave the definition of small fishing boats and operational range up to individual countries.
- Promote the registration of small fishing boats.
- Promote coordination among concerned authorities on monitoring and control of small fishing boat safety as well as socio-economic considerations.
- Strengthen local authorities and promote policies of safety at sea within coastal communities.
- Promote technical and financial support from authorities, including subsidies, at all levels for issues of safety at sea.
- Identify and promote basic requirements for safety at sea in the areas of :
 - Research on design and construction of small fishing boats including modification of traditional type boats,
 - Safety equipment including fire-fighting and life-saving appliances, and
 - Regular boat inspection systems.
- Implement training and education programs for all stakeholders including fishers and boatbuilders for the basic requirements of:
 - Boat design and construction,
 - Equipment and its correct use,
 - Search and rescue,
 - Occupational health and safety awareness, including the avoidance of dangerous fishing practices, and
 - Awareness of environmental factors.
- Develop and promote the use of appropriate communication systems for:
 - Weather forecasting information
 - Search and rescue systems
- Develop appropriate incident-reporting and investigation systems to improve safety at sea.