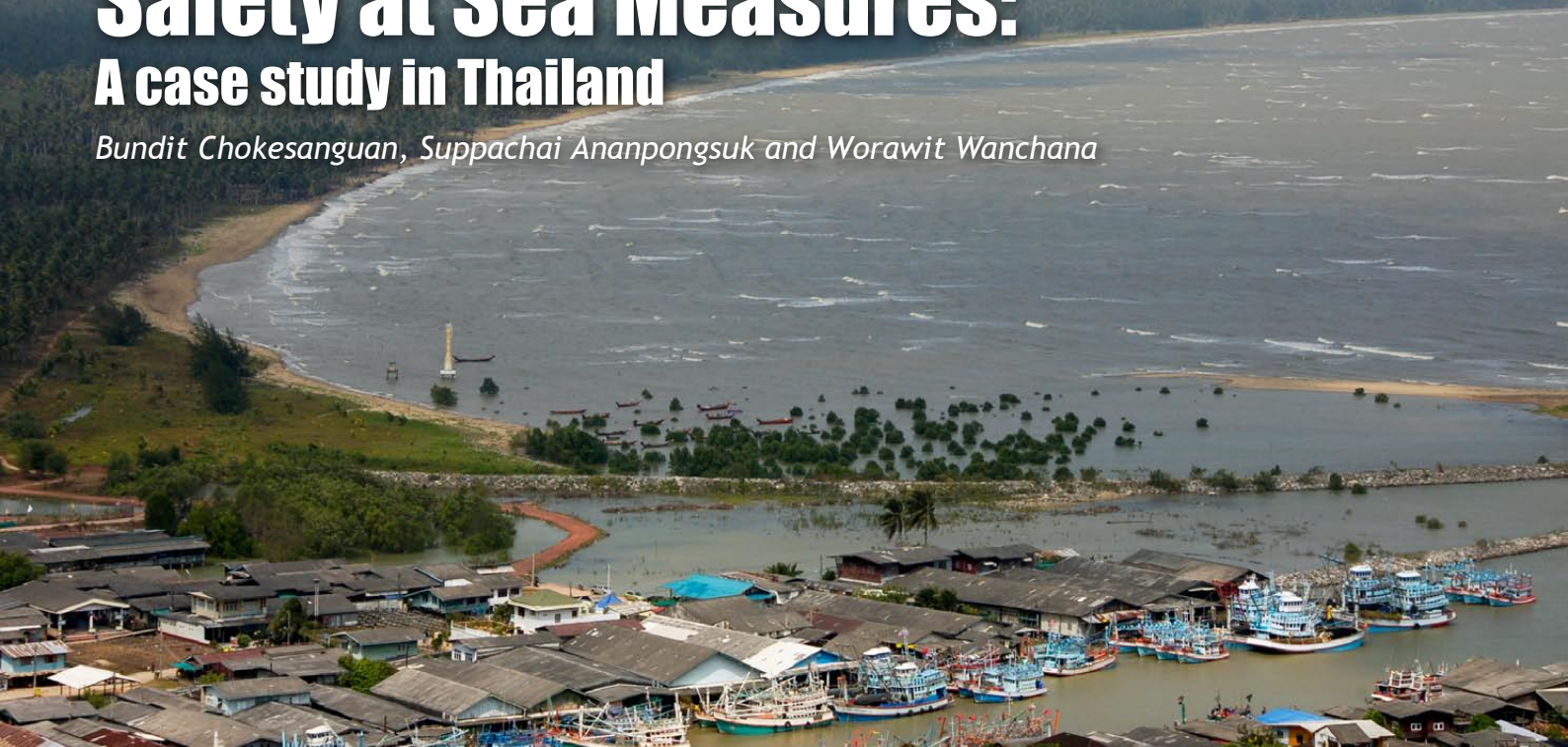


Impact of Fisheries Management in Improving Safety at Sea Measures: A case study in Thailand

Bundit Chokesanguan, Suppachai Ananpongsuk and Worawit Wanchana



This article is based on a case study conducted by the SEAFDEC Training Department to assess the impact of effective fisheries management approaches on the improvement of safety at sea measures for trawlers and purse seiners in Thailand. The study focused on the fishing boat conditions, navigation and safety equipment, the crew and their competency, working conditions, weather forecasting systems, etc., and was carried out in four areas, namely: the central, eastern and southern parts of the Gulf of Thailand, and the Andaman Sea. The data collected through the survey were backed up by interviews with boat owners, crew and other stakeholders concerned. The results of the study could be used as reference for the other countries in the Southeast Asian region in their efforts to improve safety at sea measures and promote fisheries management.

Thailand is a peninsular country with an area of approximately 514,000 km² and a coastline of 2,614 km. The country's marine fisheries are operated in two major fishing areas, viz. the Gulf of Thailand and the Andaman Sea off the west coast of Thailand. The Gulf of Thailand is a semi-enclosed sea that covers an area of about 320,000 km² and being part of the Sunda continental shelf in the South China Sea, the Gulf is rather shallow with an average depth of about 45 m. On the other side, the Andaman Sea is deeper with an area of about 126,000 km² having the features of oceanic waters.

Thailand's Exclusive Economic Zone (EEZ) covers 420,280 km² of which 304,000 km² is in the Gulf of Thailand and the other 116,280 km² in the Andaman Sea.

Fishing has a long history in Thailand and it is especially important for the people in the coastal provinces who fish to feed their families and supply fish food to domestic and foreign markets. Of its total production of 4.16 million mt in 2006, Thailand exports about 1.7 million mt valued at 5.24 billion US Dollars (**Table 1**). Marine fisheries production



Table 1. Fish production and trade of Thailand (1997-2006)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total	3,442,715	3,524,933	3,646,070	3,735,279	3,648,095	3,797,124	3,914,133	4,099,595	4,118,483	4,162,096
Marine capture	2,699,227	2,729,639	2,745,468	2,795,719	2,631,474	2,643,728	2,651,277	2,636,412	2,615,523	2,579,025
Inland capture	203,671	200,715	206,840	201,405	202,500	198,700	198,447	203,200	198,747	197,270
Aquaculture	539,817	594,579	693,762	738,155	814,121	954,696	1,064,409	1,259,983	1,304,213	1,385,801
Total Export (qty)	1,013,936	1,160,453	1,204,215	1,162,099	1,217,310	1,246,543	1,401,915	1,395,531	1,527,659	1,700,160
Total Export (value)	4,334,222	4,038,054	4,122,627	4,384,437	4,054,130	3,692,158	3,919,824	4,053,938	4,474,405	5,244,879
Total Import (qty)	701,113	716,304	913,316	813,789	977,350	1,006,011	1,078,620	1,240,181	1,444,911	1,470,203
Total Import (value)	897,715	864,580	868,077	826,699	1,072,467	1,079,379	1,133,815	1,254,617	1,457,125	1,573,144

Source: FAO FishStat Plus 2008

Note: Quantity (qty) in metric tons (mt); Value in thousand US dollars

comes from coastal aquaculture and marine capture fisheries both within the EEZ of Thailand and neighboring countries' waters.

Trawling and Purse Seining in Thailand

Otter-board trawls were introduced in Thailand in the 1960s, from which the beam trawl was developed for catching shrimps, and became a popular gear among the Thai fishers along with the otter-board trawl. As a result, the total number of registered trawlers increased from 99 units in 1960 to 11,000 in 1989 but decreased to 8,008 in 2000 and then to 4,806 in 2007.

Another effective gear is the purse seine also well known as the pelagic fish hunter. After the Chinese purse seine was introduced in 1925 for the chub mackerel fishery in the Gulf of Thailand, many Chinese purse seines were modified into Thai purse seines after World War II, using 2.5 cm mesh size. Later, the mackerel encircling gill nets or green purse seines using 4.7 cm mesh size were also introduced, and in 1973, several luring techniques were introduced one of which is the payao constructed using coconut leaves. Pelagic fishes are mainly caught by purse seines that make up about 82-85% of all gears used in Thailand, and the number of registered purse seiners increased from 585 units in 1979 to 1,504 in 2000 but decreased to 1,140 in 2007.

Moreover, the information from the Department of Fisheries (DOF) of Thailand indicated that fishing boats registered under "less than 5 GT" category decreased from 3,257 units in 1999 to 2,160 in 2003 while fishing boats registered under "more than 5 GT" category increased from 13,664 in 1999 to 13,823 units in 2003 but started to decrease to 11,824 in 2005 (Table 2). The number of registered fishing boats by type of fishing gears in 2003 comprised mainly the trawl fishing boats (Fig. 1).

With the development of more efficient gears, the total fisheries production of Thailand increased but this also led to over exploitation of the fishery resources. In this regard, many fisheries management approaches and methods were adopted and used in order to address such concern. However, the aspect of safety at sea has always been overlooked even considering that fishing is among the most dangerous occupations pursued by man. The fishermen depend on their vessels for their survival, and when a vessel is lost at sea, it is probable that some or all of the crew also lost their lives. Generally, the most common fishing vessel casualties are

Table 2. Number of registered fishing boats in Thailand (by gross tonnage (GT))

Year	Less than 5 GT (units)	More than 5 GT (units)
1999	3,257	13,664
2000	2,786	14,509
2001	3,329	12,616
2002	2,517	13,407
2003	2,160	13,823
2004	2,751	13,681
2005	2,160	11,824

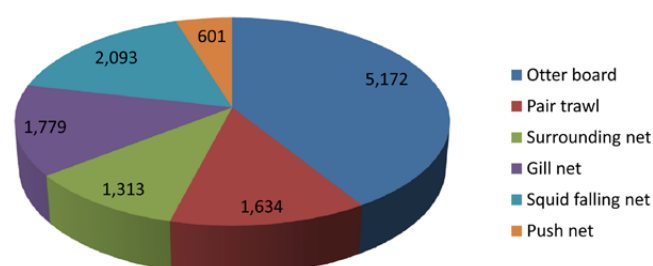


Fig. 1. Number of fishing boats registered by type of fishing method in Thailand (2003)

due to vessel capsizing, poor vessel structure, fire/explosion, and collision.

Fisheries Management Policies of Thailand Concerning Safety at Sea

With the aim of controlling the fishery activities of Thailand, Fisheries Act. B.E. 2490 (1947) provides that fishing operations are subject to various regulations (revision of the Act is ongoing). As the lead national agency for fisheries policy development in Thailand, DOF promoted the National Fisheries Development Policies that include the Policy on Management of Fisheries Resources and Environment, of which fisheries management policies are covered specifically those that relate to safety at sea such as appropriate vessel registration and fishing licensing; closed area and closed season; promotion of offshore fisheries and joint ventures; and employment of foreign labor for fishing vessels.

Vessel Registration and Fishing Licensing

While the DOF of Thailand issues licenses for fishing gears such as trawls, purse seines and gill nets, the country's Marine Department has been legally mandated to register all vessels including fishing vessels. The divided tasks of licensing fishing vessels and fishing gear by two Departments could have led to the incomplete and ineffective control of all fishing operations in the country. To solve this problem, the DOF enacted a new regulation in 1979 prescribing that applications for fishing gear licenses must attach the certificate of vessel and the license to use such vessel. This regulation, however, caused another problem since many fishing vessels, less than 14 meters in length are unable to register and acquire the necessary certificate of vessel registration. This subsequently leads to the problem of issuing a license to fish when the certificate of vessel registration is unavailable. Thus, the DOF recently

enacted an additional regulation to register fishing operators with fishing vessels smaller than 14 meters in length. Such certification can be used in lieu of the required certificate of vessel registration issued by the Marine Department.

Closed Area and Closed Season

During the spawning season of the Indo-Pacific Mackerel, certain areas in the Gulf of Thailand and in the Andaman Sea are closed for three months annually. From 15 February to 15 May each year, approximately 26,400 km² in the Gulf of Thailand is considered a conservation area to protect several commercially exploited demersal and pelagic fish species during their spawning and breeding seasons.

Fishing by all types and sizes of trawlers (with the exception of beam trawlers) as well as all types of purse seiners (except for anchovy purse seiners operating in the daytime from February 15 to March 31 only) is prohibited specifically along the coastline of Prachuap Khirikhan, Chumphon and Surat Thani Provinces as well as in the Khanom District of Nakhon Sri Thammarat Province in the Gulf of Thailand. Around the Andaman Sea, an area of approximately 1,800 km² at Phangnga and Krabi is declared as a conservation zone where selectively controlled fishing (closed season) and/or prohibition of selected fishing gear is imposed from 15 April to 15 June of each year. These approaches allow the fishery resources to recover for another round of recruitment.

Promotion of Offshore Fisheries and Joint Ventures

Recognizing that the inshore resources of the country are already over-fished, Thailand had promoted offshore fisheries while some Thai commercial-scale fishing vessels mostly trawlers, continue to fish outside Thailand's waters. Many Thai fishers have entered into joint venture fishing agreements with Bangladesh and India to fish in Myanmar



A Thai purse seiner (left) and trawler (right)

waters, and also with other countries such as Indonesia, Malaysia, Myanmar, Somalia, and Madagascar with the arrangement to share local crew onboard as well as landings in their respective coastal states. This has led to an exchange in the access to fisheries resources and enhancing the capacity of the fishing vessel crew.

However in many cases, many fishers are unfamiliar with offshore fisheries where fishing trips could last for several days, regardless of the fact that most vessels have been constructed to fish near-shore and suitable for a few days trip only. In addition, many fishing vessels have limited space for carrying safety equipment, spare parts for engine repairs, or even heavy fishing gears commonly used, posing considerable risks to the crew. There have also been instances where fishers acquire second hand fishing boats from neighboring countries that are quite old with outdated safety equipments. Many such small fishing boats or old boats sail farther out to sea beyond their designed capacity and construction. Nonetheless, the country's policy on the promotion of offshore fisheries and joint ventures could still have positive effects on improved standards and capacity of trawlers and purse seiners, as this includes regulations on the size of boats as well as the communication, navigation and safety equipments to be carried onboard.

Employment of Foreign Labor

While Thailand has shifted from an agriculture-based economy to a more industrial one, many fishers have left the fishing industry which has led to the employment of foreign labor from Cambodia and Myanmar as members of the fishing vessel crew. It was only after Typhoon Gay in 1989 and the 2004 Asian Tsunami that hit Thailand that Thai fishing vessel crew were trained on the basics of safety at sea. On the other hand, while it would take some time for foreign crew to be familiar with fishing operations, minimum attention is usually given by fishing operators to the aspects of safety. This has been cited often as one of the causes of accidents during fishing operations.

Effects of Natural Disasters on the Improvement of Safety at Sea Measures in Thailand

Besides the various fisheries management approaches, the massive natural disasters which affected Thailand in a way, led to the improvement in the safety at sea measures for the country's trawlers and purse seiners.

Typhoon Gay

Typhoon Gay in November 1989 caused significant damages to the Gulf of Thailand, especially in Chumpon Province. It was a unique full typhoon (wind speed was 120 mph at landfall), that claimed the lives of more than 600 fishers who were reported missing while two hundred fishing vessels were lost at sea. After the typhoon, the Thai Government intensified its program in improving the safety at sea measures and established the Fishermen Training Center in Chumpon Province to provide training on fishing and safety at sea onboard, boat building and weather forecasting. Moreover, early warning systems were also improved in many fishing communities along the coastal areas of the Gulf of Thailand.

Asian Tsunami 2004

The 2004 Asian Tsunami damaged many communities around the Indian Ocean including 422 fishing villages in the country's six provinces (Ranong, Phangnga, Krabi, Phuket, Trang and Satun) along the Andaman Sea coast of Thailand. In terms of fisheries, about 700 fishers died, 6,100 fishing boats were damaged and many kinds of fishing gear valued at Thai Baht 160 million were lost. After this experience, the Thai Government with the assistance from the European Union (EU) and other international organizations provided immediate rehabilitation plans (short-term and medium term/long-term) that include training in natural disasters and sea safety for fishing communities, boat building and repair under the medium- and long-term plans.

The Case Study

Considering the various fisheries management approaches and capacity building measures on safety at sea promoted by the Government of Thailand, the case study was conducted with support from the Food and Agriculture Organization (FAO) of the United Nations to assess the current situation of safety at sea on trawlers and purse seiners in Thailand as well as evaluate the improvements resulting from the promotion of effective fisheries management measures and the lessons learned from the impact of natural disasters on the fishing communities in Thailand.

The study was carried out in four areas, namely: the central part of Thailand (Samut Prakan, Samut Sakorn, and Samut Songkram Provinces), the eastern part of Thailand (Chonburi, Trat, Chantaburi, and Rayong Provinces), the southern part of the Gulf of Thailand (Songkha, Chumporn, Nakorn Srithammaraj, and Surat Thani Provinces) and the southern part in the Andaman Sea area (Phuket, Ranong, Phangnga, and Satun Provinces) as shown in **Fig. 2**.



Results of the Case Study

The results indicated different conditions of the safety at sea measures for trawlers and purse seiners in Thailand, varying in terms of the size of the fishing boats. On the average however, safety conditions of about 50% of fishing boats met the standard set by the Marine Department and the DOF.

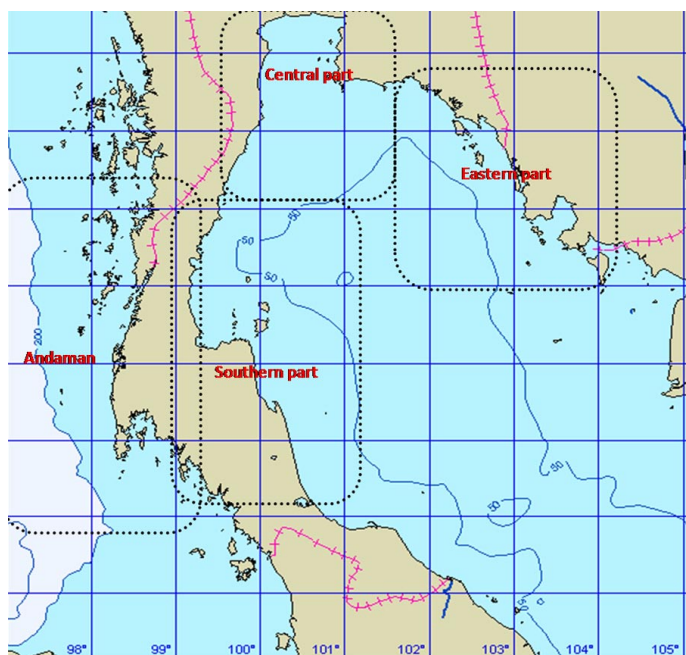


Fig. 2. Map showing study areas in the central, eastern, southern parts in the Gulf of Thailand and the Andaman Sea

Hull and Engine of Vessels

The regulation on vessel inspection of the Marine Department of Thailand provides that inspection of fishing boats including inspection of the hull, engine and fire fighting equipment as well as safety equipment onboard should be done every year while docking inspection is done every two years. Annual inspection is done when a fishing boat is afloat so that both the hull and all engines could be visually inspected for their conditions as well as for its performance. The results of the study indicated that only around 50% of boats from the central part of the Gulf of Thailand and about 65% in the Andaman Sea were checked by authorized officers annually. Furthermore, in the eastern and southern parts of the Gulf of Thailand only about 65% follow the regulations of docking within two years for overhauling the hull and other parts while only 39% of the fishing boats in the southern part of the Gulf of Thailand perform routine hull maintenance. As for navigational equipment, most fishing vessels conduct good maintenance of their equipment specifically the RADAR, GPS and Echo sounders. Special attention has always been given to Echo sounders, since these are used for navigation as well as for successful fishing operations.

Safety Equipment

In accordance with the regulation of the Marine Department, life rafts, life rings and life jackets must be carried onboard by all fishing boats regardless of size. However, most Thai fishing boats do not have any life rafts carried onboard. In fact, less than 50% of fishing boats in the central part

of the Gulf of Thailand and in the Andaman Sea have life rings while in the eastern and southern parts of the Gulf of Thailand, only small number (0-4 boats) carried life rings, respectively. The respondents also confirmed some fishing boats use the fishing gear floats as substitutes for life jackets.

Safety of Vessel Crew

In the study area, a trawler (LOA less than 15 m) fishing in areas more than 12 nautical miles away from the shore, has about 15 crew members working onboard but without having life rafts, life rings and life jackets on board. On the other hand, purse seiners (LOA equal or more than 15 m) that fish more than 24 nautical miles away from the shore, carry onboard some safety equipment such as life rings and life jackets. However in general, many fishing boats do not install life rafts. Furthermore, considering that the distance traveled by fishing boats from shore to the fishing grounds is directly related to the accidents due to bad weather conditions, alert methods employed by fishing boats should be assessed as the distance from the shore to the fishing grounds is critical during the search and rescue operations in case of accidents.

Competence of Vessel Crew

The number of crew onboard trawlers is not more than 20 persons, while that of purse seiners is about 20-40 persons. As shown in **Fig. 3**, the highest percentage of crew working onboard Thai fishing boats are Burmese nationals (50.95%) followed by Thais (24.58%) and Cambodians (24.47%). There are no Cambodian crew onboard fishing boats in the Andaman Sea while there is less than 0.5% Burmese crew in the eastern part of the Gulf of Thailand.

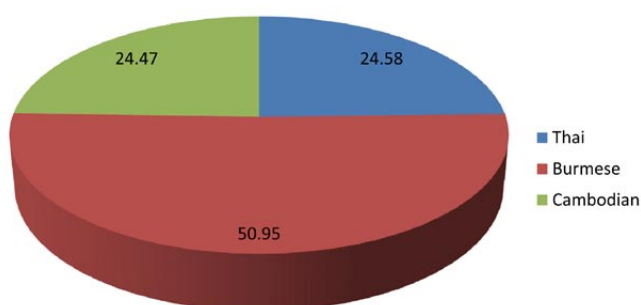


Fig. 3. Nationalities of crew working onboard Thai fishing boats

Specifically, in the central part of the Gulf of Thailand, the vessel crew is also dominated by Burmese nationals (about 58%) followed by Thais (36%) and Cambodians about 6%. In the eastern part, the vessel crew is dominated by Cambodians (about 91%) while the Thai crew comprises only about 8%. In the southern part, most of the vessel crew

comprises the Thais (49%) and Burmese (43%), and the remaining 8% are Cambodians. On the other hand, the crew of fishing vessels in the Andaman Sea is mostly Burmese and Thais, comprising 80% and 20%, respectively.

Working Periods Onboard Thai Fishing Vessels

The working hours and period of fishing operations are different in trawlers and purse seiners. Fishing operation time of trawlers starts before sunrise and is completed before midnight from net setting, net hauling until catch sorting. Normally fishing operation is done about 3 times a day, and takes about four hours for towing. During towing time, the crew sorts the fish to be kept in the fish hold. The total working time per day is 15 hours. On the other hand, purse seiners start fishing after sunset (about 22.00 hrs) and finish after sunrise, with a total working time of about 12 hours per day including time spent for net arrangement.

Weather Forecasting Facilities

The country's weather forecast services for fishing boats have been improved after Typhoon "Gay" hit Thailand in 1989. The services have been expanded to cover all fishing grounds up to 40 nautical miles in the Gulf of Thailand and up to 60 nautical miles in the Andaman Sea. Broadcasting is conducted through various media such as television and radio as well as through the coast and onshore radio station services for fishing boats. Results of the study indicated that all fishing boats sampled have communication systems onboard for receiving weather broadcasts in the fishing grounds. However, most fishing boats have no weather facsimile receivers installed.

Communication Systems

Most fishing boats use CB transceivers to communicate among ships and between ships as well as to the shore. In the eastern part of the Gulf of Thailand, more than 50% of fishing boats use SSB transceivers compared with the other areas where the use of SSBs was limited to few vessels only. However, the study also confirmed that many fishing boats usually do not use VHF transceivers because VHF radio signal could not be accessed from long distances, thus, CB transceivers have been most effectively used instead.

Environmental Responsibility

Almost all sampled fishing boats return to shore with waste materials generated during their fishing trips. The waste materials include inorganic garbage such as damaged buckets, damaged fishing gear, PE ropes, waste oil, etc., which are usually sold by the crew upon getting on shore.

Ship Facilities

The traditional Thai fishing boats have no toilets, bathrooms nor mess rooms. It was only recently that some fishing boats already have toilets or bath rooms. This means that the living quality of the crew in most Thai fishing boats is still low compared with other jobs on land. The respondents confirmed that in general, owners of fishing boats in Thailand do not pay considerable attention on safety issues and the quality of life of the crew working onboard.

Conclusion

Results from the study indicated that most Thai fishing boats (more than 70% of the fishing boats sampled) passed the annual inspection conducted by the Marine Department for docking and maintenance of engines with gear and navigational equipment installed onboard. However, life rings and life jackets are mostly not available onboard with less than 50% of fishing boats in the central part of the Gulf of Thailand and the Andaman Sea carrying these safety equipments and with corresponding very low percentages in the southern and eastern part of the Gulf of Thailand. This is in spite of the number of boat accidents at sea having been reported.

The number of vessel crew and their competence which are indicators of the safety conditions of fishing boats also varied in the areas surveyed. The number of crew in purse seiners is large compared with that of trawlers because of the differences in the fishing operation methods. There is a large number of foreign crew working onboard the fishing boats in the Andaman Sea, central and eastern parts but smaller in number in the southern part of the Gulf of Thailand, with competence not usually meeting the standard because many foreign crew did not receive any training on the basic sea safety measures. Lack of competence of the boat crew and the poor working conditions, long period of working hours may have contributed to more than 40% of fishing boats in Thailand meeting accidents at sea which is considerably high. With regards to weather forecasting system in Thai fishing grounds, it seems that this has been much improved after the catastrophic natural disasters that occurred in Thailand in 1989 and 2004.

Viewing the general picture of safety at sea for trawlers and purse seiners in Thailand, the various fisheries management measures still do not seem to promote improvements of the safety conditions of the fishermen. This may be because the responsibilities for boat registration including safety at sea promotion and fishing licensing are done by various authorities. Good cooperation among responsible sectors should therefore be promoted in various aspects of safety including collection and sharing of data. Implementation of fisheries management plans will not be successful when safety aspects on the part of the fishers are overlooked. Strengthening safety at sea inspections and enhancing awareness of responsible officers are also needed in order to increase the efficiency of inspection and enforcement. Moreover, awareness building about safety at sea for vessel crew, owners and responsible officers should also be promoted while information on disastrous accidents at sea should be monitored and disseminated in order to discern how safety at sea could be improved.

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