Changes of Andaman Sea Coastal Resources and Fishing Activities after Tsunami 2004

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ABSTRACT

The objectives of this study were to investigate the impacts of tsunami disaster on coastal resources and environment, and coastal small-scale fishing communities in 6 Andaman provinces. The study was conducted from January to August 2006 by using rapid rural appraisal, semi-structure interview and focus group methods. In addition, the secondary data, such as fishery statistics and tsunami impact reports, were also collected and synthesized. The results indicated that there was minor damage of mangrove forest in Phang-Nga and Satul whereas there were severe damage of beach area, beach forest and coral resources in Ranong. There was a slightly damage of seagrass bed and 3,957.5 rais of saline area in Ranong. The tsunami also changed water current direction, water turbidity and physical environment of fishing grounds. Fishing activities in the study areas were rather status quo; however, catches of some species after the tsunami increased abnormally. Number of local fishers decreased at a low level and the number of fishing boats increased significantly (25%). Most of the fishers (86%) mentioned that there was unfair and lack of transparency of village leaders in distribution of assistance to the victims, this resulted in diminishing of community unity. Fishers and crews from Myanmar created several social and environmental problems to coastal fishery community in Ranong and Phang-Nga. From discussions at several levels, it was concluded that for better coastal resources management program, the government should promote co-management to coastal communities while local people should participate more in resources management and environmental conservation.

Key words: impact assesment, tsunami, Andaman, small-scale fishery

INTRODUCTION

Severe earthquake under the sea near the coast of Sumatra, Indonesia, on 26 December 2004, had created enormous wave (tsunami) piling on the coasts of many countries in Asia and Africa. Six Andaman provinces of Thailand, i.e., Ranong, Phang-Nga, Phuket, Krabi, Trang and Satul were among those areas having received the violent physical damage such as changing of beach topography, changing in watercourse, damaging of mangrove forest that resulted in decreasing of aquatic animal habitat, destroying of beach which was the habitat of some clams or other aquatic resources, and the most important disaster has created severe impacts to local people. Thousands of fishery households lost their family members and assets and their way of life has changed. After the tsunami, the communities which encountered the disaster were assisted by many institutes and organizations both from the government and private sectors. The assistances covered reconstruction of the infrastructures, reviving

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occupations, providing fishing gears and urgently help them to continue their daily life. However, the assistances that have an objective on improving management program for sustainable utilization of coastal resources and environment may have some impacts to fishing communities and their capability. This study aimed to investigate the impacts on tsunami the environment, natural resources, way of community life and community economic which would lead to formulation an appropriate fishery management program for sustainable fishery in the Andaman Sea.

METHODOLOGY

This study was conducted from January to August 2006 and covered 6 Andaman provinces which affected by the tsunami disaster. The secondary data were collected from publications that cover information and data on community, fishery household, fishing gears, damage of natural resources and environment, and assistances that provided to the victims in the area. The primary data were collected through rapid rural appraisal technique, semi-structured questionnaire and focus group discussion. Twenty six sub-districts were sampled from total sub-districts in 6 provinces. In each of the 26 samples, there were 10-15 informants who provided relevant data and information, analyzed problems of coastal resources management and environment conservation and proposed coastal resources management program, and synthesized socio-economic conditions of the community. In order to obtain the degree of fishing problems 1 year after the disaster in the 6 provinces, 30 fishers were sampled from each province thus 180 fishers were interviewed. The collected data were analyzed and were compared the differences between the upper (Phuket, Phang-Nga and Ranong) and lower Andaman Sea (Trang, Krabi and Satul). The analyzed data were verified and synthesized by 30 representatives from the government, NGOs, academicians and community leaders. The statistics used in this study were descriptive and inferential statistic. The descriptive statistics consisted of percentage, mean and standard deviation. Comparison of the difference of fishery problem would be tested by t-test and Mann-Whitney U test where the normality assumption of the data should and shoud not be hold, respectively.

RESULTS AND DISCUSSION

The impact assessment was conducted in 6 provinces covering 12 districts and 26 sub-districts (Table 1).

1. Tsunami impacts

1.1 Natural resources and environment

1.1.1 Natural resources

Mangrove forest area of Andaman in 2003 was 2,093 km^2 (Royal Department of Forestry, 2005). After the tsunami, FAO/MOAC (2005) and Chotiyaputta (2005) indicated that the damage of mangrove forest of the Andaman Sea was 1,910 rais of which 1,900 rais was in Phang-Nga province and 10 rais in Satul and there was no damage in Ranong, Phuket, Krabi and Trang provinces. The study also indicated that the communities in the study areas had mentioned on the benefit of the mangrove forest in reducing the violence of the tsunami and being the natural wall that diminish the damage of property and life.

Regarding the beach area, the beach area of 1,485 rais were damaged, of which it was slightly damaged in Phuket province (212 rais), 925 rais in Phang-Nga province, 230 rais in Ranong province, 77 rais in Krabi province, 33 rais in Trang province and 8 rais in Satul province (United Nations Country Team in Thailand, 2005). For the beach forest, its total damage was 90,093 rais, the most severe damage was in Phang-Nga province (1,961 rais), 4,772 rais

Table 1 Detail of samples in the study.

Province	District	Sub-district
Phuket	Muang	Rawai and Rasada
	Thalang	Chengtale and Paklog
Ranong	Suksumran	Kumpuan and Naka
	Kapur	Muangkluang and Banghun
Phang-Nga	Takuatung	Klongkien and Kokkloy
	Kuraburi	Kura and Bangwan
Krabi	Koh Lanta	Koh Lanta Noi and Koh Lanta Yai
	Nueklong	Sriboya and Talingchun
	Palean	Sukorn
Satul	Muang	Tummalung and Koh Sarai
	La-Ngu	La-Ngu and Tungbulung
	Tungwa	Konklan

in Trang province and 30 rais in Satul province (Department of Marine and Coastal Resources, 2005).

For the coral resources, the survey of Department of Fisheries during 1995-1998 showed that there were 169 coral reefs in the Andaman coastal area. However, only 4 percent of the reefs were in a very perfect state, and the remaining 13 percent was in a perfect state, whilst the others 34 percent was in poor state and 50 percent was in a very poor state. The survey of Wilkinson *et al*. (2005) indicated that the tsunami disaster created a great damage to coral resources in many areas, the survey also found that there was 13 percent of coral reef received severe impact (more than 50% of impact level), 9 percent medium impact (31-50% of impact level), 17 percent low impact (11-30% of impact level) and 40 percent without any impact. The most impacted areas were in Ranong followed by Phang-nga, Krabi, Satul and Phuket, respectively. The sea grass obtained only small impact from this disaster.

1.1.2 Environment

The tsunami caused intrusion of saline to the soil in the area of 3,957.5 rais of which 3,500 rais were in Phang-Nga province, 412 rais in Ranong province, 23.5 rais in Krabi province, 22 rais in Phuket province and no any damage to the soil in Trang and Satul provinces (United Nations Country Team in Thailand, 2005). The problems on fisheries after tsunami included changing of current direction and velocity, unstable of tidal, water turbidity, changing of fishing areas, and changing in rocky areas at sea bed that would affect gill net operations.

1.2 Fishery resources

1.2.1 Aquatic animal resources

After the tsunami, there was an increase in some aquatic animals such as shrimp, jelly fish, crab, gastropod, tori shad, shark, threadfin bream, and ray. Six months after the disaster, total fishery production was increased in this area as a result from the increase in average catch per fisher. However, the price of fish was

rather low due to limited number of tourists and local people were reluctant to consume fish. Although the price was rather low at the beginning, it was increased later. Average catch per fisher was higher and the number of fishers was increased by 20 percent. The main problem of fishers after tsunami was higher fishing cost due to the increasing of fuel price and resulted in lower net income from fishing. However, fishery production changed by season; it would be high in January and February and low in March. From May to June 2006, there was a huge stock of jelly fish found in the Andaman Sea. The fishers informed that they could catch some new species and bigger size of fish with their regular fishing gear. Thus it might be concluded there were some changes in aquatic animal after the tsunami.

1.2.2 Fishing

Catch per unit of fishing effort (CPUE)

From the study of the Department of Fisheries, it was found that the average catch of trawler in November 2004 was 63.5 kg/hour and dropped to 58.35 kg/hour in January 2005. The catch composition of these two surveys was composed of 36 percent and 37 percent of commercial fish which were not significantly different (Andaman Sea Fisheries Research and Development Center, 2005). However, these figures of CPUE may not conclude that tsunami did not create any impact on fishery resources. It requires additional data and information to confirm the evidence.

Fishermen and fishery household

Save Andaman Network conducted a survey on impacted coastal communities from tsunami, the survey revealed that there were 389 fishery villages got an impact from tsunami of which 123 villages were in Krabi, 81 villages in Phuket, 73 villages in Phang-Nga, 51 villages in Trang, 36 villages in Satul and 22 villages in Ranong province (Save Andaman Network, 2005). The tsunami caused 4,806 destroyed fishery households of which 3,302 households were total damage and 1,504 households were partial damage. The total damaged households in Phang-Nga were 2,508 households, 1,033 households in Phuket, 658 households in Krabi, 335 households in Ranong, 190 households in Trang and 82 households in Satul. After the tsunami, 4,136 aid houses were constructed of which 2,066 houses were in Phang-Nga, 1,114 houses in Phuket, 375 housed in Krabi, 370 houses in Ranong, 204 houses in Trang and 12 houses in Satul (Department of Disaster Prevention and Mitigation, 2006). The study showed that the aid houses were not well distributed throughout all victims due to the several fishery households had more than one family lived together and some of them did not have a house registration number. Moreover, some aid houses were given to the persons who migrated to other provinces but they still registered as members of communities in the disaster areas and then their names were in the list of victims who have a right to get assistances. In addition, with lack of monitoring from the government, some village leaders who played a major role in assistance distribution did not distribute the assistance fairly. They provided the assistances to their relatives and friends as first priority. Therefore, the unity of coastal communities was destroyed and the members of communities did not trust village leaders anymore.

After tsunami, the structure of fishery households in the Andaman Sea had changed to some aspects as follows:

1) In Krabi, number of fishers did not change in some areas but in the areas that the catch was rather varied and the fish price was low the number of fishers was decreased. The fishers who quit from fishing had engaged in rubber tree plantation and tourism industry by providing boat for rent to tourists or accompany the tourists for sport fishing.

2) In Trang, a number of small-scale fishers became crews of commercial fishing vessels or work for factories in the province.

3) In Satul, a number of fishers changed from fishing to rubber tree plantation. However, it was found that, there was an increase in number of fishing boats in some areas due to assistance from donors whereas the number of fishers was stable. Therefore, some fishers hired foreign crews to operate fishing with extra fishing boats.

4) In Phuket, fishers in some areas, particularly in Ao Kung village, had quit from fishing due to the rising of fuel cost and anxiety of the tsunami. In addition, fish farmers who faced with the problem on poor water quality that resulted in low productivity had quit fish farming and turned to rubber tree plantation or work for tourism business, factory or golf course. Some fishers had engaged in small convenience shop in the community.

5) In Phang-Nga, the number of fishers in Phang-Nga bay was slightly changed. In the areas that extra fishing boats were observed, it was found that the local small-scale fishers had hired foreign crews with low payment to fish with the extra fishing boats. The foreign crews would be guaranteed to receive 10-15 percent of total value of catch as their income. Those foreign labors had settled down with their family and formed a community in mangrove and public areas. The local people and village leaders paid less attention to foreign labors because they could get advantage from them. In addition, there were a number of fishers who employed crab trap from other provinces to fish in Phang Nga waters,particularly in Kuraburi district. Therefore, total amount of fishing effort in the province has increased.

6) In Ranong, the fishing grounds of the province were exploited not only by the local fishers but also by fishers from other provinces and from the Gulf of Thailand (GoT). During monsoon season in the GoT and implementation of seasonal closure measures in the GoT, some fishers from the GoT transferred their fishing boats from the GoT to Andaman Sea by truck and fished in Ranong waters. The abundance of swimming blue crab resources in Ranong was another reason for moving fishing effort from the GoT to the province. However, there are many problems, especially social problem, from hiring foreign labors as crews or other workers. The foreign labors came from Myanmar with their family and had settled down in mangrove areas and they used all infrastructures including medical care although they are illegal immigrants. The total number of foreign labor households in the province before tsunami was 20-30 households and increased to more than 200 households after the tsunami. Some NGOs provided them education and money to construct a house in mangrove areas. Fishers from the GoT and foreign crews created severe problems on total amount of fishing effort of swimming blue crab. The local fishers in average carried 200-300 crab traps per trip whereas fishers from the GoT and fishing boats that operate with foreign crews carried 2,000 traps per trip. This resulted in rapid decline of swimming blue crab stock of the province. The local fishers in Moo 4, Taklang village, Kumpuan sub-district, Suksumran district had complained on this issue.

Number of fishing boats

From fishing boat statistics of the DOF, in 2003 there were a total of 15,799 fishing boats along the Andaman coast of which 12,072 boats (76.5%) were less than 12 m in length and 3,707 boats (23.5%) were more than 12 m (Department of Fisheries, 2005). After the tsunami, the total number of fishing boats increased to 17,495 boats or 11.9 percent (1,716 boats) higher than the year 2003. From the total, there were 3,126 boats (25%) with less than 12 m in length and 2,297 boats were more than 12 m (Department of Fisheries, 2005). These figures clearly indicated that the total number of small-scale fishing boats had increased whereas it was

decreased in commercial fishing boats. However, the increase of small-scale fishing boats might not lead to over fishing capacity in every area. In the provinces, i.e., Phuket and Phang Nga, where tourism industry had been well developed, a number of fishing boats were used for tourism activity. In addition, owing to the increase of fuel cost, some fishers operated fishing under cost sharing system. Two or three fishers joined together in a fishing boat, each fisher brought his own fishing gears and shared overall fishing cost. Individual catch was obtained by his own fishing gears. Furthermore, the fishers who operated fishing individually had reduced their fuel cost by operating boat with slow speed then the fuel consumption was decreased. In conclusion, the increasing number of fishing boats from donation did not increase fishing capacity or total amount of fishing effort of small-scale fishery in the Andaman Sea due to the reasons mentioned above.

Fishing gears

The main fishing gears in the study areas were gill nets, crab traps, some light luring fishing gears that operated by the GoT fishers within 3,000 m from shore, and trawlers. In Phang-Nga bay, there were 40-50 of small bamboo stake traps in shallow water in the past but it decreased to 15 units after the tsunami. This was a good sign that the small size fish would be saved from this type of gear. Six months after the tsunami, it was found that the fishing capacity in the Andaman Sea had declined due to high fishing cost and the fishing gears that provided for the fishers in some areas did not meet the requirement of the fishers and that gears were kept at home for other uses.

1.2.3 Aquaculture

Fish cage culture was damaged for total 5,987 farms (140,770 cages) with the area of 1,266,931 m^2. The most damaged area was in Ranong province accounted for 67.6 percent of total cages (Department of Disaster Prevention and Mitigation, 2005). From the study it was found that there were 1229, 1772, 529, 890, 480 and 1126 farms in Ranong, Phag-Nga, Phuket, Krabi, Trang and Stul, respectively. In terms of total culture area in Ranong, Phang-Nga, Phuket, Krabi, Trang and Satul, it was 856125, 184250, 53305, 64806, 23916 and 84526 m^2, respectively. The average total number of cages per farmer (with average cage size 9 m^2) was 77, 12, 11, 8, 6 and 8 cages, accordingly. For other cultures, there were 573 shrimp hatcheries, 512 farms of clam and 42 shrimp farms were damaged (FAO/MOAC, 2005). However, it should be kept in mind that these figures were obtained from the fishers who realized that the more the figures were given, the higher the assistance would be received. Thus, most of the farmers provided figures that higher than the actual figures.

1.3 Changes in fishing community

1.3.1 Economic

In general, economy of fishing households was based on fishing costs and the price of caught fish. In the study areas, it was found that fishing costs of the fishers had increased continuously due to the increasing price of fuel and fishing gears. Furthermore, the price of fish that they sold to the fish mongers was rather low compared to the rising of fishing costs. Fishing gears (gill nets and traps) were always destroyed by trawlers and other commercial fishing gears. Therefore, the net income from fishing was not sufficient for daily expenses. Because of lack of capital, most fishers obtained loans from fish mongers under a condition that they had to sell their catches to the fish mongers who determined the fish price without negotiation. Thus, most of the small-scale fishers were in vicious circle.

1.3.2 Social

After the tsunami, the unity of community had changed both in positive and negative ways. The positive way was the community had created many group activities, i.e., fish cage

culture management for sustainable culture, coastal resources management, occupation and livelihood improvement, seeking new sources of income (mainly from traditional fish processing) and crab bank program. Those activities mainly created common benefit to the members of community, thus the members had incentive to unite.

For the activities that created only private benefit, the impact was negative to unity. The activities that created diminishing unity were distribution of assistances from donors, management of community revolving fund, misuse of loan and loan distribution. From the study, the degree of negative was higher than positive impact and it was also found that many community leaders were not trusted by community members due to their unfair management on assistances distribution. The members mentioned that only the members who are relatives or friends were in the first priority to get assistance and some of them received assistance more than others whereas many members received later or nothing.

2. The differences of fishery problems in the upper and lower region of the Andaman Sea

From the study it was revealed that 0.7 percent of the samples were faced with severe problems in fishing activities whereas 11.0, 33.8 and 54.5 percent were faced with rather severe problem, slightly less problem and less problem, respectively. In the upper region of the Andaman sea (Ranong, Phang-Nga and Phuket), one-third of the samples had slightly less problem (35.4 %) and two-thirds (64.6 %) had less problem. For the lower part of the Andaman Sea, 1.5 percent of the samples had severe problem, 24.2 percent had rather strong problem, 31.8 percent had rather less problem and 42.2 percent had less problem.

The statistic analysis showed that there was a significant difference (Aymp. Sig. =0.000) of the problems between the upper and lower Andaman Sea at the confident level of 95%. The problems that people of the upper region had realized as they had more important than the lower region, at the confident level of 95% were fuel price, cost of living and debt. The problems which had less important for the people in the upper region were the number of fishers, fishing gears, fishing ground, price of fish, conflict in fishery, collaboration among fishers, and reaching to fishery information. The only one problem which was not different between the two regions was the problem of CPUE.

3. Suggestions on issues of coastal resources and environmental management

From discussions with fishers and other stakeholders in several levels, there were suggestions on issues of coastal resources and environmental management and others as follows:

3.1 Issues on fishery law enforcement and participation of fishers in law enforcement.

- Strengthen law enforcement to poachers who operated fishing within 3,000 m from shore with trawlers and push net.
- Support fisher groups in community to participate in fishery law enforcement.
- DOF should allocate appropriate fishing zone for small-scale and commercial fishery. The bordering of each zone should be clearly identified through natural or manmade landmark.
- An appropriate mesh size of fishing gears particularly crab trap should be clearly defined for conservation purpose.

3.2 Issues on fishery data and information

- In order to obtain up to date and reliable fishery data and information for fishery management planning, DOF should strengthen data collection system of the Department. The data on number by category of fishers, fishing boats, fishing gears, fishery production by sectors should be available.
- With limited number of DOF staff on fishery data collection, DOF may collaborate with local university and local administrative

organization in collecting fishery data and information.

• For better management program, important economic species should be assessed regularly and if possible some species should be assessed by zone.

3.3 Issues on lacks of information by community

• A fishery information center should be established in local administrative office and create network among them.

• Strengthen community capability in knowledge management.

• DOF should provide knowledge through training or media on new concepts of fishery management for fishers and other stakeholders in order to assure that they have a common understanding.

3.4 Issues on declining of coastal resources

• Recover fishery resources through crab bank program, artificial reef installation and release fingerling of appropriate species.

• Develop fishery co-management for coastal fishery. This required close collaboration among government officers, NGOs, local administrative organization, fishers and researchers.

• Urgently adopt fishery management measures, i.e., area closure and seasonal closure should be implemented in the sea areas where strong scientific evidence support.

• In order to reduce total amount of fishing effort, an alternative source of income should be provided for the fishers who want to quit from fishery.

• New fishery law that support appropriate fishery management program for every sector in fishery should be enacted soonest otherwise the situation of fishery industry will be getting worse and may lead to the collapse of industry.

3.5 Issues on fishing cost, unfair fish price and foreign crews and fishers.

• DOF may continue to provide subsidized fuel price to small-scale fishers. However, it should be kept in mind that this may against with WTO agreements.

• DOF should have clear policy on foreign crews and fishers, fishery zoning and multi-national fishing boat.

• Central fish market system should be introduced to fishing communities. With this system, the fishers can obtain a better price that has happened in many communities where this system has been developed.

3.6 Issues of fishing community after the tsunami

• The immigrant Myanmar fishers and labors in the community should be regulated urgently in order to avoid overfishing and social problems.

• Due to the changes in physical of coastal area after the tsunami, the government with collaboration of local people should access the changes and regulate coastal resources especially land utilization of the community.

• Strengthen the unity of fishing community that diminished from the unfair distribution of assistances. An appropriate system for assistance distribution should be established in the community.

CONCLUSIONS

The study has revealed that, in general, tsunami did not create severe impact to coastal resources and environment. Only some limited areas of coral reef and mangrove forest recieved a strong impact but they can recover in a short period especially mangrove forest. However, it has no scientific evidence to confirm that fishery resources got any impact from the tsunami. The figures from scientific studies are not sufficient to conclude that there is a significant change in fishery resources. The information from fishers in the disaster areas has shown that some deep sea species and big size fish

came to the coastal areas where they never appear in the past. These induced fishers from the GoT and Myanmar to fish in the disaster areas without management and then resulted in the decline of coastal fishery resources. There was a minor change in coastal fishery, the total amount of fishing effort of small-scale fishery seems to be unchanged although there were extra number of fishing boats from donation. A number of fishers quit from fishery to other occupations but it was replaced by fishers from the GoT and Myanmar. In conclusion, the problems of fishers in the study areas are more or less with their classic problems on resources depletion, high fishing costs, low fish price and invading of trawlers and push net in 3,000 m from shore. For social problems, the main problem was diminishing of community unity as a result from conflicts during the distribution of assistances from outside.

In order to eliminate or minimize those problems and establish proper management program for the disaster areas, the DOF and DMCR should urgently monitor, assess and recover coastal resources in the areas. Fishery data and information collection system as well as data base system for decision making should be improved and implemented on regular basis. An appropriate fishery management program for the Andaman Sea fishery should be formulated in close collaboration with local fishers. A suitable subsidy program that is not against WTO agreement should be provided for small-scale fishers who have less. The unity of fishing community should be strengthen through group activities that they will have common benefit such as central fish market in the community, crab bank program, etc. The unity of fishing community is needed for fishery co-management development. Finally, fishers from Myanmar must be strictly regulated under the present laws in order that social problems created by them can be eliminated or minimized.

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