

BOTTOM SET BAG NET FISHERY CONDITION IN KAPOR BAY, RANONG PROVINCE OF THAILAND

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Introduction

Fishery has been generated income for fishers from directly utilizing aquatic resources. Different fishing gears had impact in decreasing of fishery resources at different levels. Appropriated utilization of fishery resources, not to be over the reproductive of the resources would help in balancing the ecosystem. Fishing gears, which impact to fishery resources to be decreased, should be restricted. Bottom set bag net fishery was used to harvest all type of fishery resources which most of them was fish larvae that come along with the current. This bottom set bag net could be found all over Kapor Bay even though Department of Fishery had announced it as restricted fishing gears. Since the product from this fishing gear was used widely for aquaculture feeding in the bay, fishers and aquaculture farmers had opposed against such management measure and result in unable controlling of this gear. The aims of the research were to study bottom set bag net fishery, fish product proportion, and the opinion of fishers in which would lead to appropriated bottom set bang net fishery management in Kapor Bay with less impact to fishery resources and maintain sustainable fishery further.

Material and method

Study area

The area of Kapor Bay, Ranong Province is covering two districts of Kapor and Suksamran. The outer part of the Bay is connected to the Andaman Sea when the central part is connected to canal which bring freshwater to the Bay. The inner part of the Bay is the location of 3 main canals in which appearing the total 159 units of bottom set bag net fishery.

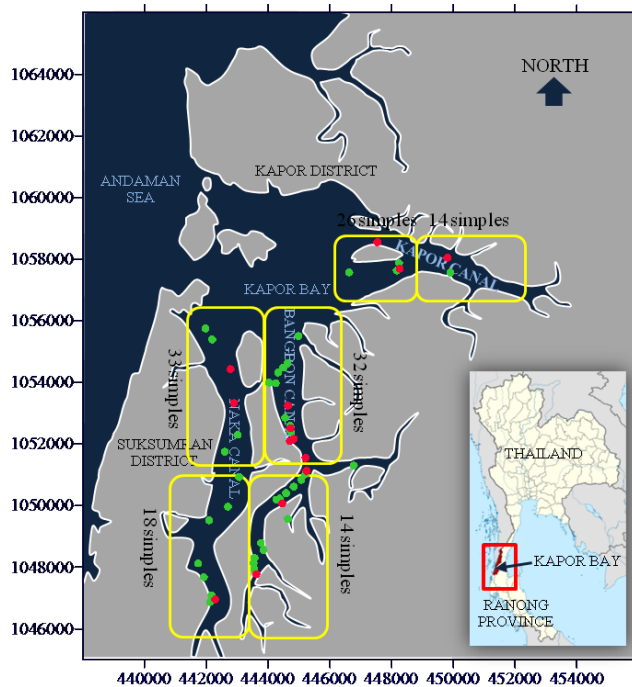


Figure Bottom set bag net in Kapor Bay, Ranong province, Thailand (green – bottom set bag net, red – representative bottom set bag net of fish collection with number of samples in black color)

Naka Canal: the total number of 69 units of bottom set bag net was found (43.4%). Naka canal is a large canal connected to Suksamran district. The nets were found all over the canal.

Method

Bottom set bag net fishery information, including fishing gears, fishing method, catch, and opinion of fishers on bottom set bag net fishery and management, were studied by interviewing 38 fishers. This sample size was calculated by the formula for determination the sample size to estimate a population proportion at 98% confidence interval and $\pm 6\%$

Kapor Canal: the total number of 18 units of bottom set bag net was found (11.3%). Kapor canal, where less density of bottom set bag net was found, is opposite to the opening of the bay.

Bangbon Canal: the total number of 72 units of bottom set bag net was found (45.2%). Bangbon canal is located in the central part of Kapor Bay which composed of many small canals. Bottom set bag nets were found all over the canal where most dense at central part of canal.

precision (total population was 1,059 fishers with 11.9% of bottom set bag net fishers and mud crab farmers).

The 137 representative samples of aquatic resources were collected from fishers in 6 stations of bottom set bag net fishery in Kapor, Bangbon, and Naka canal which were covered upper, central and lower part of the Bay. Data collection was performed during May 2009 to February 2010 in order to study a species composition. The fish samples were classified into 3 groups of economic fish, which was consumed by human at its adult both internationally and locally, a trash fish, which was used for animal feed, and groups of shrimp, squid, crab and others.

Data analysis was performed using a statistical package program. Descriptive statistics such as median and quartile deviation were used to describe data. The difference comparison of fish production between located areas of fishing gear was analyzed using Mann-Whitney U test statistic. Spearman's rank correlation coefficient was used to analyze the correlation between the fisher's opinion and the perception of news.

Results and discussion

Bottom set bag net fishery



Bottom set bag net is composed of polyethylene net with the mesh size of 1.8-6.4 cm. The mesh size at the cod end was smallest when some fishers used the net with mesh size of 0.1 cm. The length of the net was ranged from 25.0 to 40.0 m. (Figure 2).

Figure 2 Bottom set bag net

Fishers operated bottom set bag net fishery mostly at 02.00-04.00 am in spring tide of every month (18-20 days/month) when water current and tide influenced trapping of the fish. The net was sunk under water when operate fishing and only buoys at the net entrance and cod end were visible above water (Figure 3).



Figure 3 Bottom set bag net fishery



Fishers operated bottom set bag net fishery during ebb tide. Fish entered the net and gathered at the cod end. Fishers started to collect fish when the tide was almost at the lowest point by lifting up only the cod end of the net and discharge the fish into the boat (Figure 4). The fish was utilized as trash fish or feed for fish cage culture.

Figure 4 Fish collecting from bottom set bag net

Bottom set bag net fishery production

The study of the fish production derived from the bottom set bag net fishery in the area of Kapor Bay was found that the median fish production was 50.0 kg/trip with the quartile deviation of 26.5 kg/trip. The first and third quartiles were 25.0 and 78.0 kg/trip, respectively. The minimum fish production was 2.0 kg/trip while the maximum fish production was 293.0 kg/trip. Fish production classified by areas was appeared as follows:

- 1) In the area of Kapor canal, the median fish production was 37.5 ± 17.4 kg/trip which was the lowest production. The range of fish production was 10.0-50.0 kg/trip. The first and third quartiles were 15.25 and 50.0 kg/trip, respectively.

- 2) In the area of Bangbon canal which gives the highest production, the median fish production was 60.0 ± 25.6 kg/trip. The fish production was ranged 2.0-293.0 kg/trip. The first and third quartiles were 42.25 and 93.5 kg/trip, respectively.
- 3) In the area of Naka canal, the median fish production was 50.0 ± 37.0 kg/trip and the minimum and the maximum fish production was ranged 10.00-277.0 kg/trip. The first and third quartiles were 30.0 and 104.0 kg/trip, respectively.

The comparison on the median fish production per fishing effort between canals found that there was a significant difference of fish production between canals ($p < 0.05$). The fish production derived from Kapor Bay was the lowest with the median of fish production was 37.5 kg/trip. This production was difference from the fish production obtained from Naka and Bangbon canals. The median of fish production obtained from Naka and Bangbon canals were 50.0 kg/trip and 60.0 kg/trip, respectively (Table 1).

Table 1 Production of bottom set bag net

| Canals | n | Production (kg/trip) | | | | p-value |
|---------|-----|----------------------|-----|-------|-------------------|---------|
| | | Min | Max | Total | Median \pm QD | |
| Kapor | 40 | | | , | 37.5 ± 17.4^a | 0.000* |
| Naka | 51 | | | , | 50.0 ± 37.0^a | |
| Bangbon | 46 | | | , | 60.0 ± 25.6^b | |
| Total | 137 | | | , | 50.0 ± 26.5 | |

Remark : * $p < 0.05$, Quartile deviation (QD) and difference alphabet represents significantly different median fish production between canals at $\alpha = 0.05$.

Fish composition

The species composition derived from the bottom set bag net fishery found that more than half of the proportion of species composition (51.1 ± 20.9 %) was an economic fish (Figure 5) and a trash fish (42.7 ± 20.1 %), respectively. In group of economic fish, the species found the most was anchovy (Figure 6). Other species founded were toothed ponyfish, yellowtail scad, thryssa and common ponyfish. Furthermore, species founded in group of economic fish were giant catfish, snapper, fourfinger threadfin, russell's snapper, stonefish, white sardine, slender rainbow sardine, jarbua terapon, javelin grunter, cobia, silverbidy, crested hairtail, sillago, Indo-Pacific mackerel, goby, tonguefish, spinefoot, barracuda, queenfish, yellow-

banded scad, humpbacked mangrove cardinalfish, mackerel, yellowfin bream, lizardfish, trevally, dorab wolf-herring, spotted sicklefish, african pompano, chacunda gizzard-shad, spotted scat and tiera batfish.

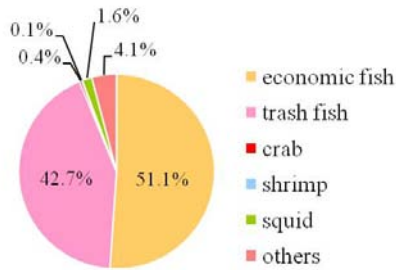


Figure 5 Fish proportion of bottom set bag net

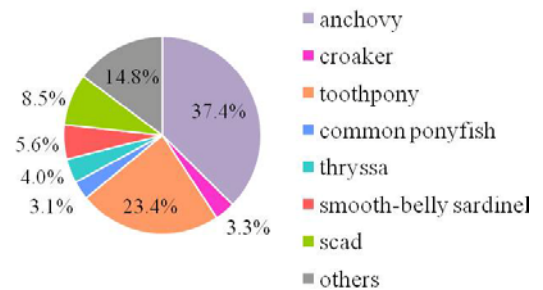


Figure 6 Economic fish proportion

When classifying by areas, the most proportion of species composition found in the inner part of Bangbon canal (Figure 7B) was a group of economic fish (68.9%). The most proportion of trash fish was found in the outer part of Naka canal (48.1%) (Figure 8A). Group of shrimp was found most proportion in the outer part of Kapor canal while group of squid was found most proportion in the inner part of Bangbon canal.

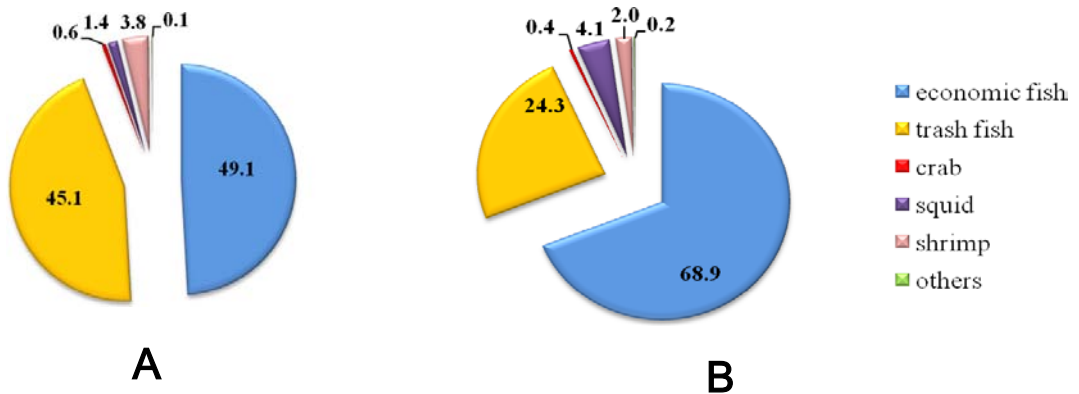


Figure 7 Proportion of catch in outer part (A) and inner part (B) of Bangbon canal

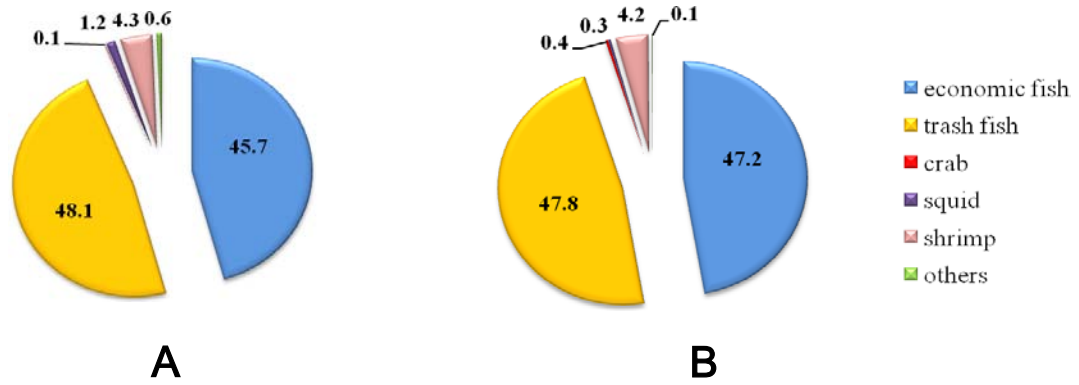


Figure 8 Proportion of catch in outer part (A) and inner part (B) of Naka canal

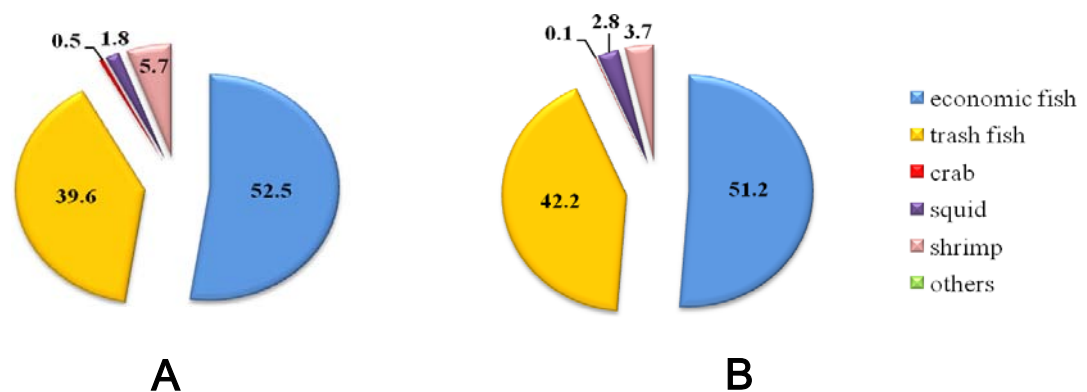


Figure 9 Proportion of catch in outer part (A) and inner part (B) of Kapor canal

The calculation of an average proportion of economic fish was performed base on fishing effort in each area. The difference comparison was found that at least one area has a significant difference the average proportion of economic fish with the others ($p < 0.05$). The average proportion of economic fish in the area of Bangbon canal was highest, 68.9 ± 15.1 . It was significant difference with the average proportion obtained from Bangbon and Naka canals (49.1 ± 18.3 and 45.7 ± 26.8 , respectively).

The fisher's opinion to Bottom set bag net fisheries management

The fisher's opinion on bottom set bag net fisheries management was studied with 38 fishers. About two third of fishers (68.4%) agreed to use cod end of bottom set bag net with mesh size of less than 0.1 cm. Two-third of fishers agreed with zoning of bottom set bag net and disallow to construct the bottom set bag net in nursery ground. Half of fishers (50.0%) disagreed with the measure of seasonal closure due to the need in utilizing the resources for fish cage culture and the fishers only operated fishing in spring tide. Most fishers (81.6%)

disagreed that the utilization of fresh food in fish cage culture and mud crab culture had destroyed the fish larvae. In their opinion, the fishing gear affected to the amount of fish larvae was a push net which has been used in the area of Bangbon and Naka canals. Fishers who operate push net had joined in the project of buying back the push net of Department of Fisheries (DOF). This project aimed to give alternative choices to push net fishers for changing their occupation from push net fishery. However, the precautionary practice was still the limitation for the government and local fishers were unable to carry forward the practice following the co-agreement which was result in continuously operating of push net fishery.

For the result in part of fisher's opinion on the bottom set bag net fishery management, more than half of fishers (55.6%) thought that the present fishery management is not optimal. While 64.9% of fishers thought that the establishment of fisher group is suitable. Most fishers (87.1%) expressed their opinion that fishers had interested in ecosystem but the participation approach between government and community to preserve the resources is not suitable. Furthermore, the local organization did not pay any attention to the ecosystem.

For the fisher's opinion about aquatic resources and activities in Kapor Bay, all of fishers thought that it is needed to have resource utilization management though some fishers thought that the area provided a good fishery production (67.6%). Furthermore, 62.9% of fishers thought that it is needed to have an impermissible area for fishing. Most fishers (97.4%) known that some activities e.g. push net fishery and bottom set bag net fishery had affected the ecosystem of Kapor Bay.

For the opinion on fishery resources management, more than one-third of fishers (36.8%) agreed with the fishery community based management. The community member should learn about the resources in order to determine an appropriate utilization. Most fishers had interested in determination the management approach but they did not have a leader, especially leaders from the government. In order to achieve the management goal, local organization should participate in determination the management approach. Community leaders should perform collaborative learning in resources utilization with community members. Further, co-learning activities need to be done in order to enhance knowledge about ecosystem in Kapor Bay. Conservative consciousness of fishers should be built in order to preserve fishery resources. The factors significantly related to the opinion on fishery

resources and fishery management were collaborative learning ($p < 0.01$) and the perception of news and information ($p < 0.05$), respectively. The levels of relationship were 56.2% and 33.1%, respectively. Furthermore, the result showed that the factor of news and information interested has a positive significant correlated with the opinion on fisheries resources management at significant level 0.10 ($p = 0.083$) and the level of relationship was 28.5% (Table 2).

Table 2 The correlation analysis between fishery resources management and other factors

| Issues | n | Pearson Correlation Coefficients (r) | p-value |
|---------------------------------|---|--------------------------------------|---------|
| News and information interest | | | |
| Collaborative learning | | | |
| News and information perception | | | |

Remark: $p < 0.05$, ** $p < 0.01$

Median of Catch Per Unit of Fishing Effort (CPUE) was 50.0 ± 26.5 kg/trip which was higher than the study of Aksomboon and Keawner (2001) who found an average CPUE at Kraburi River of 39.47 kg/trip. Kapor Bay was characterized by wide bay with numerous small canals which were suitable habitat for aquatic animals. The proportion of fish was differed from one another due to the different environment e.g. salinity, and water current. The proportion of economic fish were found mostly in inner Bangbon canal (68.9%) with the highest production (60.0 ± 25.6 kg/trip) due to the characteristic of the area which was composed of many small canals and result in introducing the fish to dwell on. Fishery measures and agreements such as fishery conservative zoning or mesh size limits to be bigger than 0.1 cm should be strictly enforced in the area.

Conclusion

Bottom set bag nets was a stationary fishery gear which were found all over the central and inner of Kapor Bay in Kapor canal, Bangbon canal, and Naka canal. The total 159 bottom set bag nets were found in the bay. The nets were composed of large bag net at different mesh size with the total length of 25.0-40.0 meters. Fishers operated this gear all year round in

spring tide due to the influent of tide in fishing with fishing day of 18-20 days/month. The median CPUE was 50.0 ± 26.5 kg/trip with the highest average production of 60.0 ± 25.6 kg/trip in Bangbon canal. The proportion of economic fish was 51.1 ± 20.9 . The economic fish were generally found in the market and some were found locally e.g. anchovy, toothed ponyfish, yellowtail scad, soldier croaker, and fourfinger threadfin.

Bottom set bag nets fishery management approach should be cooperated from fishers and get along with fisher opinion in which leading to real practice, worthily utilize the resources, and sustain fishery resource and fish cage culture. Moreover, increasing of news and information perception by problems collaborative analyzing which follow the community agreement would be a solution for collaborative utilization in order to achieve impartiality of community members.

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