

Seasonal variations in small-scale fisheries in Rayong, Thailand

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Small-scale fisheries using crab gill-net, fish trap, squid trap, trolling line, and hook-and-line constitute one of the important industries in Rayong, Thailand. The purpose of the present study is to clarify the seasonal variations such as catch amount and landing price, species caught and operation sites in these fisheries. Field surveys on small-scale fisheries were conducted from November 2012 onwards. Thirteen fishermen in total were targeted, and log-books were distributed to all the target fishermen who were asked to record details of their fishing operations every day. These items were (1) date of fishing operation; (2) number of fishing gear used or retrieved; (3) number of fishermen on-board; (4) species, weight and price of the landed fish; (5) time of departure and return to pier; and (6) amount and price of fuel purchase. Portable GPS devices were connected to the fishing boats to record their positions at 3-min intervals in order to determine the operation sites where fishermen deployed and retrieved the fishing gear. Fishing boats were 6.5 m long and 2.0 m wide and were made of wood with approximately 18-horse power diesel engines. On-board surveys were conducted to observe fishing operations. Data on weather conditions such as wind speed, wind direction and sea conditions were obtained from the Meteorological Department Station in Rayong Province.

Seasonal changes in wind speed in the Rayong coastal area

Seasonal changes in wind speed in the Rayong coastal area were analysed based on data collected at the Meteorological Department Station. The average wind speed from October to April was less than 2 knots; however, wind speed during the Southwest monsoon season from May to September was higher. The average wind speed was more than 4.0 knots during Southwest monsoon season and about 6.1 knots in September 2013. Thus, wind speed in the Southwest monsoon season differed considerably from that in other seasons. The Southwest monsoon affected the Rayong coastal area where fishermen conduct fishing operations.

Crab gill-nets

The fishermen used crab gill-net of a total length of 450 m, consisting of five 180 m long plane nets made of nylon monofilaments with a mesh size of 100 mm and a twine diameter of 0.3 mm. Fishermen usually left the pier for the fishing grounds at approximately 5 a.m., retrieved up some sets of gill-net and returned to the pier at approximately 10 a.m. The gill-net was retrieved about 3 days after deployment. Fishermen removed the catch from the gill-net and sold it to middlemen after returning to the pier. The predominant target species is Blue swimming crab *Portunus pelagicus*. The number of days per month on which fishermen conducted operations was small during the Southwest monsoon season, but increased from September (the end of the Southwest monsoon season) to February. The number of days of operation per month was greater than 20 from September to February, and the landing amount and income also increased in December,

January, and February. The fishing operation sites changed during the Southwest monsoon season. Fishermen deployed the gill-nets behind the Samet Island, an area that is not affected by the Southwest wind.

Fish traps

Fish traps were made of a wooden frame covered with a polyethylene net and wire webbing; the traps were 2.06 m long, 0.95 m wide, and 0.50 m high with an entrance. Fishermen set fish traps on the seabed around coral reefs or artificial reef with the direction of the entrance parallel to the tidal current. The soaking time of the fish traps were about one week. Fishermen went to sea for 6–7 hours to retrieve about 10 fish traps per trip. The species predominantly targeted were Rabbitfish *Siganus javus* and *Siganus canaliculatus* and Longfin grouper *Epinephelus quoyanus*. The number of operation days per month reduced during the Southwest monsoon season, but operation sites where fishermen deployed the fish traps did not change. Catch per fish trap (CPUE) was higher during the Southwest monsoon season than in the other seasons.

Floating squid traps

The floating squid trap was semi-cylindrical, 80 cm wide, 95 cm long and 100 cm height, and had one entrance. The trap was connected to a sinker using a rope 1.0–1.5 m in length and to a float using another rope, in order to set the trap afloat above the sea bottom with the entrance facing upwards. Egg clusters were placed inside the trap to attract squid. If egg clusters were not available, fishermen used white plastic tape to imitate eggs. Main target species were Bigfin reef squid *Sepioteuthis lessoniana* and Cuttlefish *Sepia aculeata*, which were fully mature. Thus, the trap had good selectivity for species and size. The number of operation days per month was not affected by the Southwest monsoon, although the number of the traps deployed decreased. Moreover, catch amount also decreased during the Southwest monsoon season. The traps were placed near a coastal area about 10 km off the coast during the Southwest monsoon, but is maximum about 50 km off coast in the other season.

Trolling line and hook-and-line

Trolling line and hook-and-line were largely used to catch Bigfin reef squid *Sepioteuthis lessoniana* and Spanish mackerel. Small fish as well as artificial lure were used as bait. The number of operation days per month as well as the catch amount decreased during the Southwest monsoon season. The trip required a whole day (about 11 hours), and fishermen conducted fishing operation in a wide area off the Rayong coast. The fishing operation site did not appear to be affected by the Southwest monsoon. The main catch from February to June is the Bigfin reef squid, and from October to December is the Spanish mackerel. Thus, main catch differed due to the season.



Photo 1. Small scale fishery conducted in Rayong, Thailand.
(Left: Crab gill-net, Middle: Fish trap, Right: Floating squid trap)