The use of Traditional FADs in Thai Fisheries and the Review of it's possibility to Apply in IOTC area

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Abstract

The EEZ of Thailand covers 420,280 km^2; 304,000 km^{2}in the Gulf of Thailand (GoT) and 116,280 km^{2}in the Andaman Sea coast of Thailand (ASCoT). There are 23 coastal Provinces surrounding such two main fishing areas, including 17 Provinces in the GoT with a coastline of approximately 2,700 km (1,143 miles) and 6 Provinces in the ASCoT covering 865 km (537 miles) of coastline. The fishing grounds are devided into 7 zones, 1-5 in the GoT and 6-7 in the ASCoT

Purse seiners are the main fleets for fishing coastalpelagic fish.The total number of purse seiners is 1,641 whichinclude 10 m tolargerthan 25 m boatlength. The1,224 boats are operated in GoT and the 417 boats are operated in the ASCoT. The materials and construction of the Thai FADs for purse seining which are usually set in depths ranging from 20 to 50 m. The FAD is composed of bamboo pole, anchor line, weight and coconut leaves.

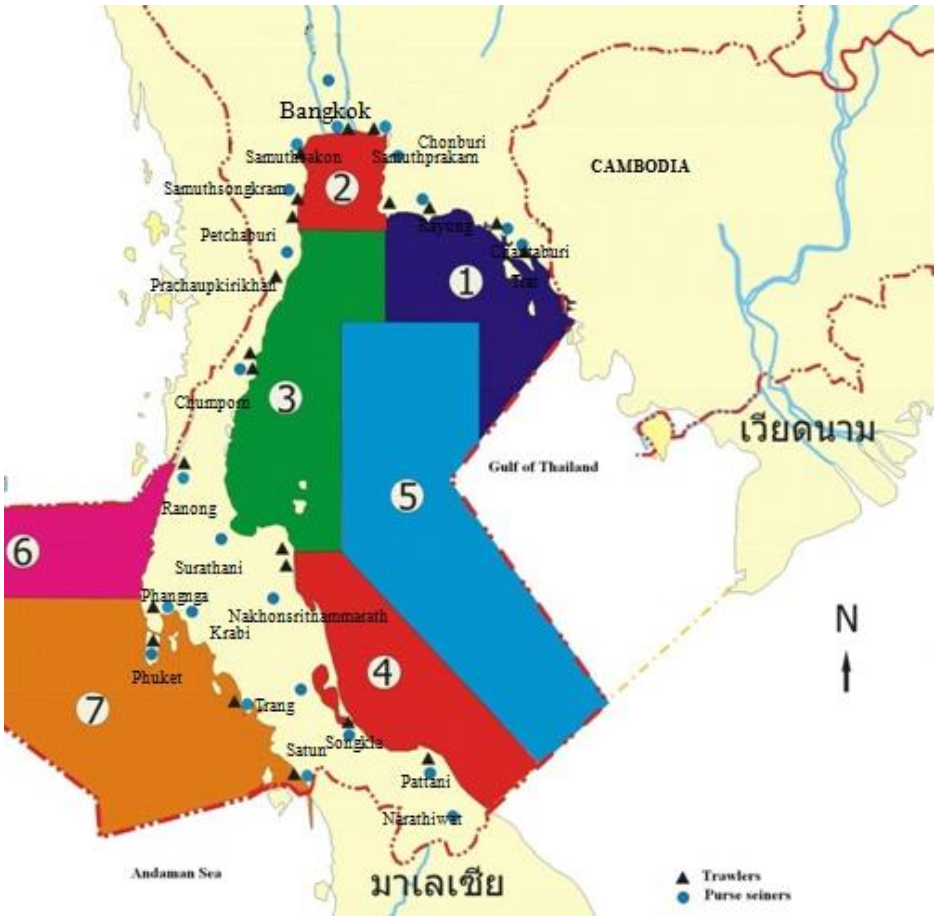
The main fishing grounds of surrounding net were distributed around ASCoT part. The major species caught were Indian mackerel (*Rastrelligerkanagurta*), Round scads (*Decapterusmaruadsi*), Yellowtail scad (*Atule mate*), *Euthynnusaffinis, Auxisrochei* and other species constituting 21.71, 20.73, 10.23, 3.22, 1.49 and 42.62 % of the total catch, respectively.

The materialof Thailand traditional FADs were low cost and fishermen can find in Thailand It’s construct from bio-degradable materials.Reduce bycatch or incident catch (Turtle, marine mammals, Sharks) followed by RFMOs conservation measurement.

1. Introduction

The EEZ of Thailand covers 420,280 km^2; 304,000 km^2 in the Gulf of Thailand (GoT) and 116,280 km^2 in the Andaman Seacoast of Thailand (ASCoT). There are 23 coastal Provinces surrounding such two main fishing areas, including 17 Provinces in the GoT with a coastline of approximately 2,700 km (1,143 miles) and 6 Provinces in the ASCoT covering 865 km (537 miles) of coastline. The fishing grounds are devided into 7 zones, 1-5 in the GoT and 6-7 inthe ASCoT .

The total 147 fishing ports locate along the coast of Thailand which included 1-2 major fishing ports for commercial fleets in each province **(Figure 1).** Although commercial fishing boats mostly landing at theirprovince fishing ports, some fleets have wide fishing area along the coastline and landing at the closest ports to fishing grounds, especially trawlers. It alsoshould be noted that, in the 6 Provinces along the Andaman Sea Coast, the landing portof trawlers is not provided in Krabi Province but purse seiners are the main fleet of the Province



① Eastern GoT: Trat, Chantaburi and Rayongprovinces

② Inner GoT: Chonburi, Chacheongsao, Samuthprakarn, Bangkok, Samuthsakorn,Samuthsongkram and Petchaburi provinces

③ Western GoT: Prachaupkhirikan, Chumporn, and Suratthaniprovinces

④ Lower GoT: Nakhornsrithammarath, Songkla, Pattani and Narathiwatprovinces

⑤ Middle GoT: the midlle area of the GoT to the EEZs of Malaysia and Cambodia

⑥ Upper ASCoT: Ranong and upper part of Phangnga provinces

⑦ Lower ASCoT: Phangnga Phuket, Krabi, Trang and Satun provinces

Source: Amnouy Kongprom et al. Status of Marine Resources from Commercial Trawler in the Gulf of Thailand and in the Andaman Sea, Marine Fisheries Research and Development Bureau, Department of Fisheries

Figure 1 Provinces in the five coastal zones of Thailand.

The catch from fishing grounds within Thailand's EEZ contributed from the Gulf of Thailand (GoT) and from the Andaman Sea coast of Thailand (ASCoT). It show the decreasing trend from the both fishing ground. In 2011, the total marine catch was 1.37 million tons in which the GoT contributed 70% and the ASCoT shared the 30% (Figure 2). The catch included pelagic fish (41.2%), demetsal fish (10.6%), cephalopod(10%), miscellaneous fish (3.7%) and crustaceans (5.6%) and trash fish (21%)

The two categories of Thai fisheries are commercial fisheries and small -scale fisheries. The small-scale fisheries refer to fisheries that employ the boats that are less than 10 gross tonnage and are either non-powered. Most small-scale fishers operate near shore and use traditional fishing gears. The commercial fisheries mainly comprise trawlers, purse seiners and gill-netters. The trawlers are used to exploit demersal fish while purse seiners and gill-netters are used to exploit pelagic fish.

2. Purse Seine Fisheries

Purse seiners are the main fleets for fishing coastal pelagic fish.The total number of purse seiners is 1,641 which include 10 m to larger than 25 m boat length. The1,224 boats are operated in GoT and the 417 boats are operated in the ASCoT (Table1).

Table 1 Number of purse seiners in Thailand, 2014

Area	Number of boat by boat length			
	Total	<14 m	14-18 m	>18m
ASCOT+GOT	1,461	151	236	1,074

Source: *http://www1.fisheries.go.th/it-stat/images/stories/bookboat/ThaiVessel2557.pdf*

Design of Fish Aggregating Devices (FADs) for Purse Seining in Thailand

Fish Aggregating Devices (FADs) have been used by Thai fishers to aggregate fish schools for a long time. As of 1969, there are few designs of FADs based on the target species and fishing gear, the most common of which are the bush pile for encircling net and fish shelter for purse seine and lift net. **(Figure.2)**

Fish shelter for purse seine and lift net

Also known as *Sung* in Thai language, this FAD is very famous for purse seining operation in Thailand. In the marine fisheries statistics of Thailand, marine production by purse seine with FAD had been recorded in 1974 as almost equal to the data from purse seine by free fish schooling FADs in Thailand come in various designs for small-scale and large-scale fisheries purposes. FADs for purse seine fishing operations are being used in the Gulf of Thailand as well as in the Andaman Sea

Source: *http://www.chinglewtackle.com/index.php*

Fig. 2. Local FAD in a fishing ground of the Andaman Sea

Masthawee (1986), the result of a fishing survey by SEAFDEC fishing gear technologists in 2003 described the materials and construction of the Thai FADs for purse seining in the central part of the Gulf of Thailand, which are usually set in depths ranging from 20 to 50 m. The FAD is composed of bamboo pole, anchor line, weight and coconut leaves, the details of which are described below:

1) One to three bamboo poles, 10-15 m in length are tied together by iron wire. A hole is drilled at the base of the bamboo pole for passing the iron wire or a piece of 40 mm diameter polypropylene rope. The iron wire or rope is spiked into a big ring to serve as joint with the anchor line.

2) Coconut leaves are individually tied with the anchor line. The number of coconut leaves would depend on the sea depth, but usually 7 to 20 fronds are set with a FAD at intervals of 1-3 m.

3) Iron wire No.12 or No.13, diameter 3-4 mm, 3-5 pieces are twisted together or polyethylene rope diameter 10-12 mm, or iron wire 5-6 mm diameter, is used as anchor line. The length of the anchor rope is shorter than sea depth by about 3-5 m.

4) Stone or sand bag weighing 40-50 kg serves as sinker in shallow water area. In the deeper areas, the sinker used for fixing FAD should weigh 70-130 kg. Nowadays, some concrete weight is used replacing the stone because big stones suitable for a sinker of the FAD are rarely found.

Construction of a FAD is carried out onboard during the trip to the fishing ground and setting is done one by one in the fishing ground. The interval of each coconut leaf-FADs should be 500-1000 m distance. Generally, purse seiners deploy 20-50 sets of FADs for their fishing operations. The fish schools usually concentrate around the FADs after 1-2 weeks from setting, although in some areas where fish is abundant, aggregation in the FADs could be observed after 3-5 days. The life expectancy for this model of FAD is 2-3 months.

Other FADs design was found in the eastern part of the Gulf of Thailand in Rayong Province. The details of the FAD constructed by small-scale fisherman for squid jigging, set at the depths of around 20-25 m are described below and shown in **(Figure3).**

1) One bamboo pole, 5-7 m in length is tied together with a piece of Styrofoam with buoyancy of about around 2 kg. Coconut leaves are individually tied with the anchor line. The number of coconut leaves is depends on the sea depth but usually 5 to 7 fronds are set with a FAD at intervals of 1-2 m.

2) Polyethylene or Polypropylene rope diameter 5-7 mm is used as anchor line. The length of the anchor rope is shorter than sea depth about 1-2 m. A stone or sand bag weight or concrete weight, 15-20 kg serves as sinker.

FADs in Rayong Province are usually deployed in groups. Each group of FADs is composed of 5-7 individual FADs. The design of the FADs in the Andaman Sea, specifically in Phan-gna Province, is almost same as the FADs design in the Gulf of Thailand. On the other hand, for purse seine fishing at the deeper depths in the Gulf of Thailand at around 50-60 m, the design of the FADs is detailed below:

1) One bamboo poles, 6-8 m in length are tied together with a piece of Styrofoam with buoyancy of around 2 kg. Coconut leaves are individually tied with the anchor line. The number of coconut leaves depends on the sea depth.

2) Polyethylene or Polypropylene rope diameter 10 mm or iron wire 4-5 mm diameter is used as anchor line. The length of the anchor rope is shorter than sea depth by about 3-5 m. A few pieces of concrete weight made of 200-liter drum filled with concrete, is used as sinker.

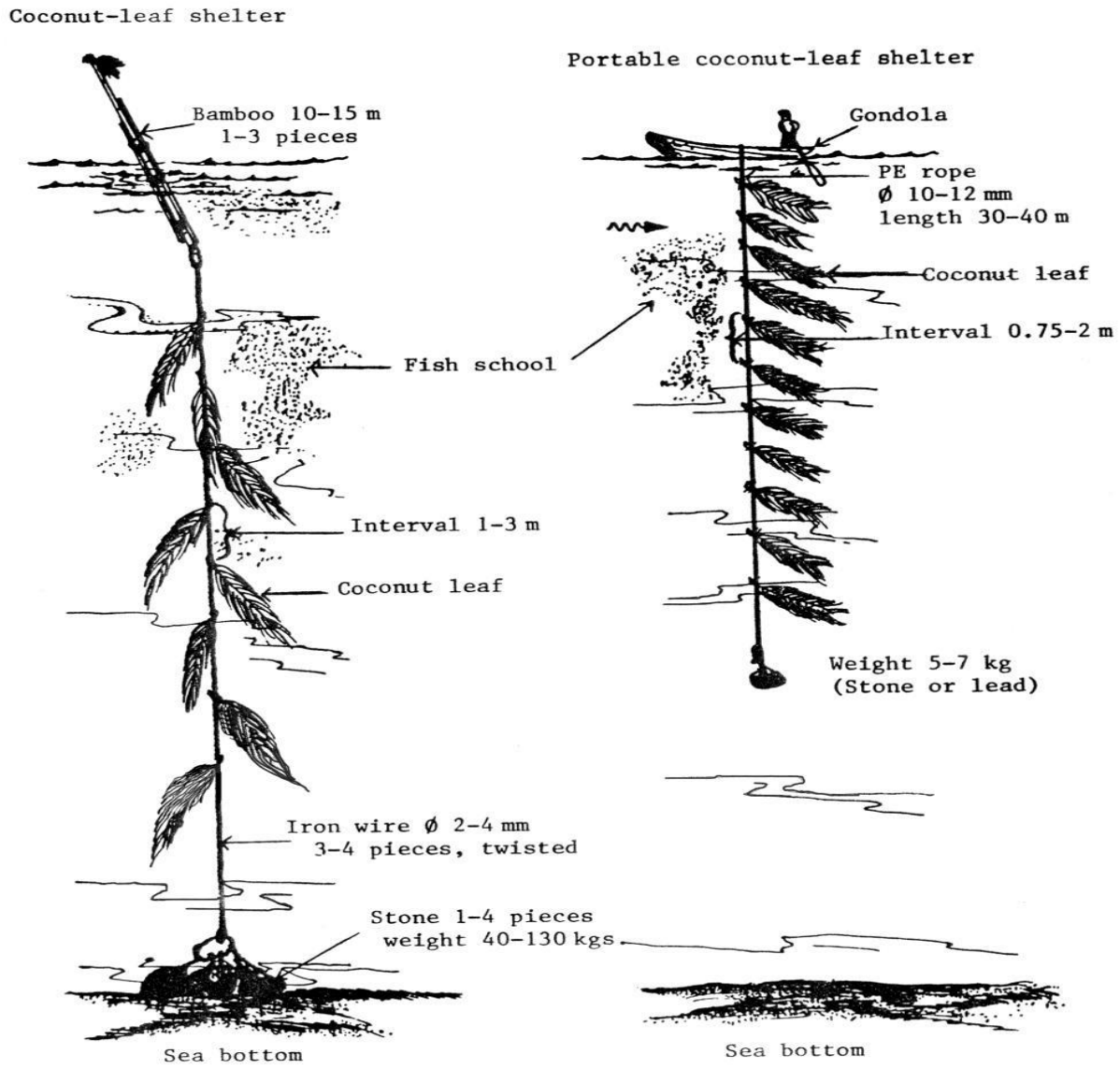


Figure3 Construction of FAD (*Sung*) for Thai purse seining in the central part of the Gulf of Thailand (**Masthawee, 1986**)

Fish Aggregating Devices (FADs or *Sung*) operation

Thai fishermen prepare the anchored FAD using bamboo poles, wire and coconut leaves, which together is fastened to a concrete block. The purse seine operation by surrounding FAD

(coconut leaf shelter) as described by Masthawee (1986) is classified into two (2) main operations, *i.e.* daytime fishing operation and nighttime fishing operation **(Figure 4).**

Fishing operation with FADs

The fishing operation, fish schools are located by hydro-acoustic equipment or by ocular checking method. If there is inadequate fish school beneath the FADs, the first FAD is pulled slowly by the net boat towards the second FAD. The fish school under the shelter usually follows the first FAD. While approaching the second shelter, the net boat accelerates its engine to full speed, pulling the first FAD passing the second FAD and resetting in another location. The fish school from the first FAD usually moves to gather at the second FAD. If the quantity of fish school is still inadequate, the fish school from the second FAD is aggregated with the fish school under the third FAD by same method. The operation starts by deploying a row-boat with a portable FAD. The row-boat slowly moves against the current direction, while the FAD is slowly pulled by the net boat passing the row-boat with the portable FAD. While the net boat is pulling FAD and reaching the row-boat with portable FAD, the net boat accelerates its engine to full speed, pulling the FAD while passing the portable FAD and resetting in the other location. The fish school from the FAD is gathered under the portable FAD. Then, purse seiner starts its shooting operation by surrounding the row-boat and the portable FAD.

During the purse line hauling, the row-boat and portable FAD will be maintained at the center of the net circle, far away from the net gap and foredeck of the purse seiner until the purse ring is hauled up on the purse seiner. The portable shelter will be pulled up and stored in the row-boat. The row-boat moves out of the net circle during the net hauling operation. The remaining fishing operation is the same as in the aforementioned procedure.

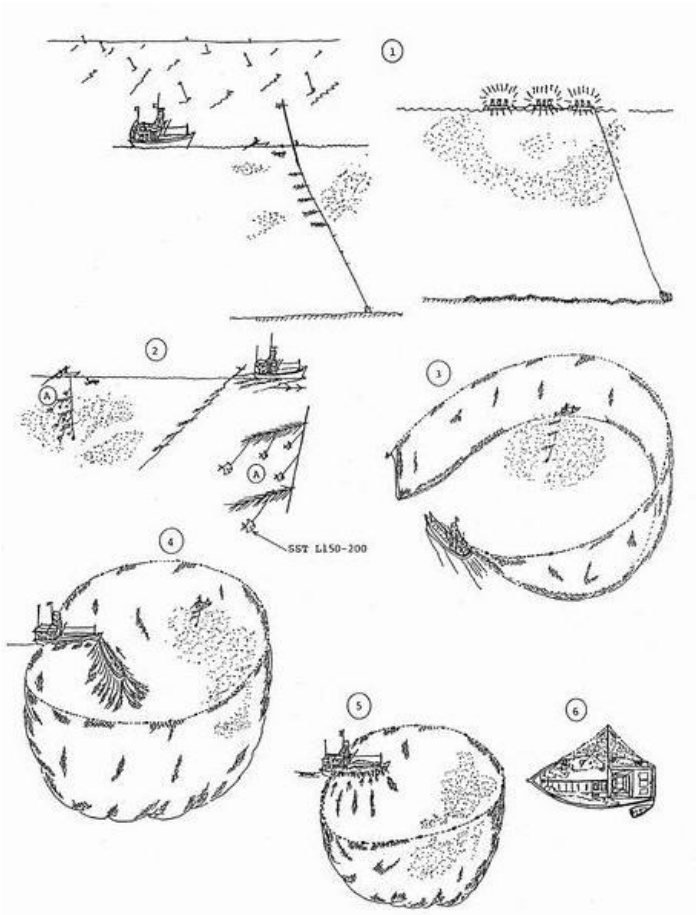


Figure 4 Fishing operation of surrounding net with purse line (mesh size 25.0-29.9 mm): FAD surrounding method

The advantage-disadvantage of Thailand traditional FADs

1. FADs material (Coconut leaf)is low cost and fishermen can find in Thailand.
2. FADs and bouys are construct from bio-degradable materials.
3. Reduce bycatch or incident catch (Turtle, marine mammals, Sharks) followed by RFMOs conservation measurement.
4. Traditional FADs attract fish school less than commercial FADs.