

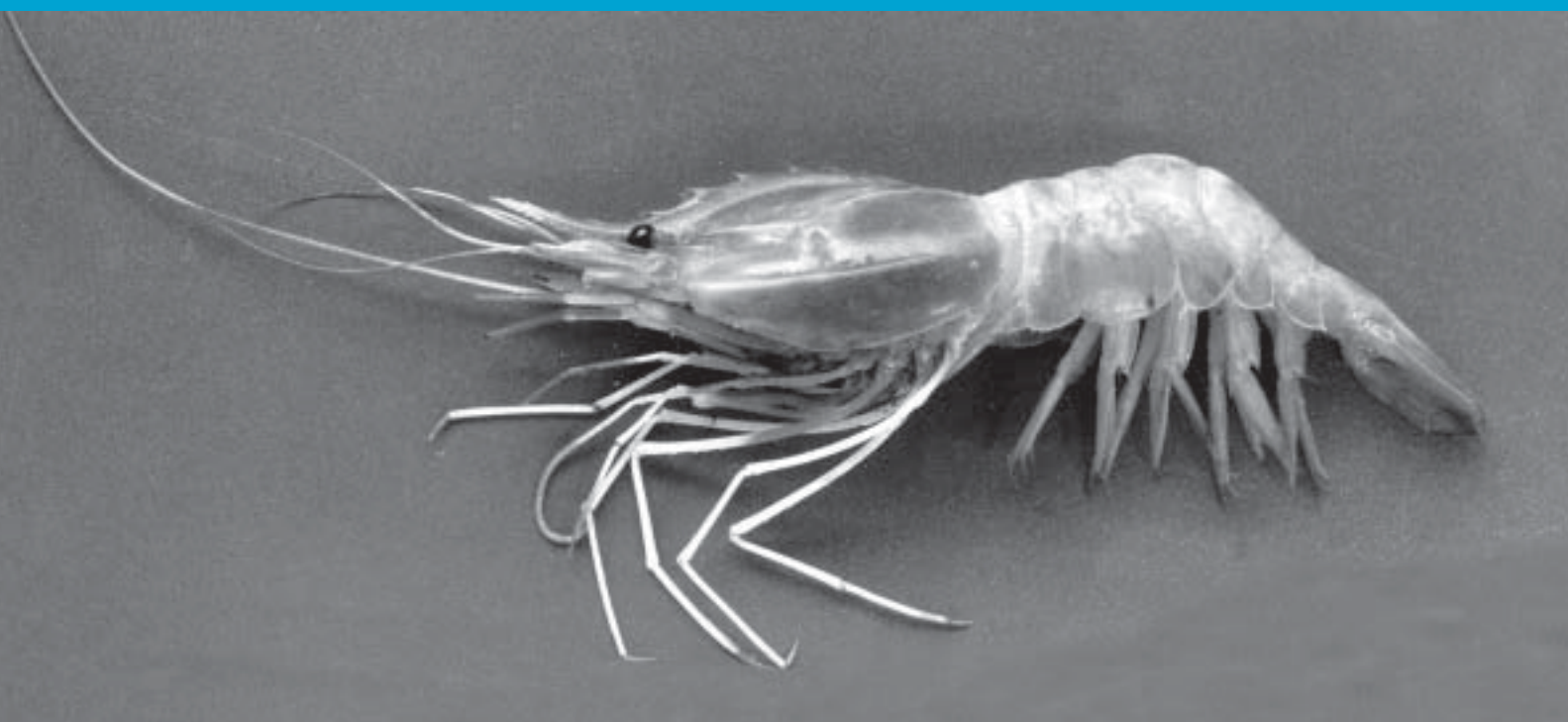
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1046 Perspectives on tuna purse seining using “Payao” in the Indian EEZ

Tunas and billfishes form important marine fishery resources in the Indian EEZ. The current annual production of tuna and tuna-like fishes from our coastal waters is estimated at 52,297 t (2001). The annual all India average production of tuna and billfishes during 1985-1995 was 39691 t. A progressive trend in the tuna catch was recorded, with a peak in 1990 (52060 t). However, the landings have shown a declining trend thereafter. There is no organised fishery for tunas along the Indian coast except in the Lakshadweep Islands. The Indian tuna fishery can be categorized into coastal and oceanic fisheries.

Coastal fishery : The common species of tunas and billfishes represented in the fishery are *Euthynnus affinis* (Kawakawa), *Auxis thazard* (Frigate tuna), *A. rochei* (Bullet tuna), *Sarda orientalis* (Oriental bonito), *Thunnus tonggol* (Longtail tuna), *T. albacares* (Yellowfin tuna), *T. obesus* (Bigeye tuna), *Katsuwonus pelamis* (Skipjack tuna), *Tetrapturus audax* (Striped marlin), *Makaira indica* (Black marlin), *Istiophorus platypterus* (Sail fish). *E. affinis* contributes to over 65% of the total tuna landings whereas, *K. pelamis* constitutes more than 75% of the tuna catch in the Lakshadweep Islands. The crafts engaged in the tuna fishery are essentially small mechanised and non-mechanised units such as gallantries, dugout canoes and catamarans. In Lakshadweep Islands, the fishery depends on the pole and line fishing and troll lines.

Oceanic fishery : The tuna and billfish production in the Indian Ocean (IPTP areas 51 & 57) was 1,106,518 tonnes (1995) with the western Indian Ocean contributing 74.1% (820,189 t) and eastern Indian Ocean

28.88% (286,329 t). A progressive increase in tuna production was recorded during 1985-1995. The nominal catch of tuna contributed by India to the total Indian Ocean tuna production was 92,583 t comprising 80,779 t from area 51 and 11,804 t from area 57, during 1995. About 65% of the tuna production was contributed by chartered vessels, 33.5% by Indian flag vessels and 1.55% by Government survey vessels. Although yellowfin tuna is the major catch component of chartered vessels, the Indian owned vessels are targeting the bigeye as well.

Potential production : The estimated potential yield of coastal tunas from the depth zone of 50-200 m of the north-west coast, south-west coast, south east and upper east coast, Lakshadweep and the Andaman & Nicobar islands has been estimated at 263,000 t. The estimated potential of tuna in the EEZ is 500,000 to 800,000 t and an estimated 250,000 t can be exploited through additional inputs and expansion of the tuna fishery.

In view of the rich potential exploitable resource of tuna in the Indian EEZ, the high export demand for both frozen as well as fresh tuna meat (Shashimi) and the priority assigned by the Indo-Pacific Tuna Programme (IPTP) for the development of tuna fishing industry, the possibilities and prospects for enhancing tuna production, through the introduction of “Payao” associated tuna purse seining is discussed below.

“Payao” as Fish Aggregating Device (FAD) for tuna fishing : “Payao” is a fish aggregating device (FAD) traditionally used by fishermen in many

countries in the Indian Ocean viz., Philippines, Taiwan, Japan, Korea, Thailand, Indonesia. Payao is a fish shelter designed by fishermen to attract fish. It can be any floating, submerged or anchored material, made of bamboo, steel or other materials, underneath which is a line or lines with sinkers to which are attached coconut leaves, twigs bunches of branches of trees, plastic strips, netting or the like.

A typical bamboo-raft payao : It comprises of four components-the bamboo raft frame, the anchor lines with the suspension weights, main anchor weights and the “Habong” or coconut fronds. The fronds are the principle feature of *payao* as it serves to attract the fish. They are tied along the length of the rope at 1 or 2 m intervals. Fish (tuna) are attracted to light, they have sheltering/harboursing/agggregating behaviour and bigger fish are attracted to small fish which seek shelter and feed on algae which grow on the *payao*.

The traditional *payao*, is usually set in the coast for tuna pruse seining and long lining. The deep sea tuna fishing industry has developed tremendously by the use of *payao*, as it has reduced the search in the sea for tunas.

Payao units are set about one month in advance of the fishing season from 1000 to 3000 m deep, 15 to 50 km away from the shoreline and concentrated usually along the migratory paths of tuna.

The fishing gears benefiting by the use of *payao* are in line fishing - handline, pole & line, multiple handline, troll line; in net fishing - bag net, gill net (drift & encircling) and seines (sardine purse seine, tuna pruse seine, ring netters).

The Southeast Asian Fisheries Development Centre (SEAFDEC) *payao* is the modified version of the typical

traditional *payao* and which is the most common type used by the commercial tuna pruse seiners in Japan, Thailand, Philippines, Taiwan and Korea. The *payao* is made of GI pipe frame of 4 x 4 or 5 x 5 m size, with a bamboo frame over it. Old fish net of 8-10 m length is attached to the frame under which the fish aggregates. At the time of purse seining, a skiff with luring lights is sent to the *payao* to keep the aggregated school intact. Commercial operators usually shoot the net only after assessing the size and density of the fish school based on SONAR and echosounder recordings. A radio buoy is used to track the *payao* set along a particular path, since the *payaos* usually drift with the current over several thousand kilometres.

During the Indian Ocean Cruise on board MV SEAFDEC, (October-November 1997) *payao* associated tuna fishing was carried out. *Payaos* were set six months in advance all along the cruise track to facilitate aggregation of tuna schools. The *payaos* were tagged with a radio buoy. During the cruise, each *payao* is detected by the radio buoy identity by using the RADAR. The tuna school under the *payao* was identified and the density of the school was assessed using SONAR and echosounder. Preparations for shooting the purse seine net were begun. The “skiff” with luring lights was sent to surround the fish school. The purse seine net is paid out around the school and the “purse” is pulled up. The tuna caught in the “bunt” of the purse seine is scooped out using the scoop net and dropped into the fish hold. The MV SEAFDEC has a fish holding capacity of 100 t. During the cruise three purse operations were carried out and about 100 t tuna were landed. The “*payao*” was lifted up on board after the purse seine fishing operation. All operations were carried out mechanically.

Prospects for ‘payao’ associated tuna purse seining:

Given the abundant stock of coastal and oceanic tuna resource in the Indian EEZ, with tremendous potential for increasing the level of exploitation, there is ample scope for development of tuna purse seining.

Payaos in coastal waters : The traditional fishermen in many of the Indian Ocean countries such as Philippines, Korea, Japan have been using *payaos* in the bays, lagoons and near shore waters for aggregating several species of fish as well as fish/shrimp larvae. In the seventies, several other countries in the Indian Ocean (Seychelles, Mauritius, Sri Lanka) have also introduced FADs with tremendous success.

Payao is easy to set up, cheap and effective in aggregating fish schools. *Payao* can be made/constructed with locally available materials such as bamboo, casuarina, old tyres, drums, coconut fronds etc., with a light on the underside to lure fish. The smaller tunas that aggregate at the surface can be easily caught by the small-scale fishermen using ring netters or purse seines or hand lines. Significant rise in the earnings of small-scale fishermen who do not own a ‘*payao*’, but engaged in handline fishing in ‘*payao*’ area, have been recorded in Philippines. Small-scale fishermen can be organised into *payao* groups, in identified areas where abundant fish stocks are known to school. *Payao* fishing, thus, can evolve into a community-based activity, assuring higher catch, income, reducing the strain of moving further into the deeper waters for fishing and reduce social conflicts.

In Lakshadweep Islands, where pole and line fishing with live baits is already in vogue, introduction of *payao* can further enhance the aggregation of fish stocks and

reduce pressure on the live baits. The Lakshadweep and Andaman & Nicobar islands offer immense scope for *payao* associated tuna fishing by pruse seining as well as by hand line/pole & line, both in the near shore and deeper waters.

Payaos in the oceanic waters : Commercial purse seiners and longliners in several countries in the Indian Ocean are currently using the modified *payaos*. Given the vast potential stock of tuna resource in our EEZ, the installation of FADS would prove to be highly productive. The deployment of industrial type (59-72 m OAL) Purseseiners and longliners for fishing in the deeper waters would be more productive if it is adapted with luring and aggregation of the highly migratory and schooling tuna stocks in the Indian EEZ. Highly productive zones (Lat 12° N - 16° N and Long 69° E and 74° E) have been identified in the Indian EEZ, where *payao* associated tuna purse seining/long lining could augment production. The assessment of the size and density of the fish aggregated under *payao* is facilitated by SONARS on board and each of the *payao* set in the deeper water can be easily tracked with RADAR and radio-buoy detector, thereby reducing the effort and time spent on scouting for fish schools.

The installation of *payaos*, whether in the coastal or deeper waters, is constrained by few adverse effects viz; species other than those targeted also aggregate under *payao* (eg. mammals); juveniles also aggregate under the *payao* leading to depletionary effect on stock. However, mammals have not been reported in any of the *payao* associated tuna fishing.

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