

“Light on” Light assisted seasonal fishery of squid along Saurashtra coast of Gujarat

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In India, artisanal fishery plays a pivotal role in the livelihood of the fishermen and contributes 81% of the sector. The small-scale fishermen carry out fishing with traditional craft and gears with or without outboard engines (Kanthiah, 2010). The operation is mainly confined to the near shore region with relatively small crafts and simple fishing gears. In small-scale fishing, fishers mainly rely on the experience and traditional ecological knowledge and uses fishing practices known for centuries (Jadhav, 2018). One of the major problems faced by the small-scale fishing sector of the world is competition from the mechanized sectors and declining catches which pressure them to make technological changes. Gujarat is one of the leading states in marine fish production and currently holds the second position in the total marine landings in India. Gir-Somnath ranks first in total marine landings in the state and second all over the country. Gujarat fisheries is dominated by trawlers followed by gillnet setters. Doll netters, artisanal long liners, bag net setters are some of the other fishing gears operated in the state. About 11.2% of total marine captures is contributed by the small-scale fisheries of the state. (CMFRI, 2019).

Light and visual systems highly influence the interaction of marine animals with fishing systems (Arimoto et al., 2010). The light assisted fishing has been practiced by humans from historic time and it has been started as a simple approach like burning fire on seashore to attract fish. Later this technique become part of common fishing method which promises successful and effective harvest of commercially important species. Many Asian countries viz, Japan, Korea, Malaysia, Vietnam, Thailand, and Philippines widely practiced light fishing. In Japan, all the squid jigging boats, stick held dipnets and more than fifty percentage of the fleet operating purse seines use light for fishing (Mohamed, 2016). In India, with a history of more than 200 years, the Chinese dipnets of Kerala, use lights to attract fish

over the dipnet. But the use of artificial lights in the commercial fishery of India has reported from the west coast of the country in the end of 2013. The order issued by the department of Animal Husbandry, Dairying & Fisheries (DADF), Govt of India dated 10th November 2017, prohibits the installation and use of artificial lights in mechanized and motorized trawlers, purse seines and gill net setters in the Indian Exclusive Economic Zone.

In order to study the coastal light assisted fishery of Saurashtra coast, a survey was conducted along the Veraval and Jaleshwar region of Gujarat. The study revealed that almost 10-15 years back, there was a targeted light assisted fishery for shrimp with cast net. During those days battery operated torch and burning fire were used as light source. Later on, during night time (multiday fishing) fishers observed the attractive response and schooling behavior of squid to the light attached with gillnet setters. Understanding the behavioral response of these economically important molluscs, few fishers started using artificial lights targeting squids. Gradually the practice became more popular and advanced and gradually spread throughout Saurashtra coast and presently at Gir Somnath district alone more than 200 boats are engaged in light assisted targeted fishery of squid.

In Veraval, gill nets of various mesh sizes are operated throughout the season. Depending on the season, catch from the gillnets may fluctuate. Once the catch from gill net is less, the fishers shift to the light-based fishing for squids. In Saurashtra coast, light assisted fishing is purely seasonal. Fishing starts in the middle of October with peak landing in December and January (winter months). Fishing is carried out in very near coastal waters and boats can be easily spotted from the beach itself. Fishing is restricted within 50m depth. Based on the availability and detection of school, cast nets are be operated from evening to morning. Besides cast net, scoop net is also

used for harvesting the aggregated cephalopods. As squids are columnar, they constitute major catch. While bottom dwellers like cuttlefishes, other pelagic and demersal fin fishes became bycatch. The average catch ranges from 20 - 500 kg in a single trip. Entire unit is assisted and operated by 2-3 fishermen. The same FRP outboard motor boats (OBM) used for gillnet fishing is used for light fishing with suitable modifications. Dimension details of the vessel are given in Table 1

Table : 1 Details of FRP boats used for light assisted fishing

Specification	LoA (m)	Breadth (m)	Depth (m)	Engine Power (hp)
Dimension	5-12	0.5-2.5	0.5-1.5	6-9.9

Specification of light used

LED bulbs are the main source of light. Some vessels are equipped with halogen bulbs and fox lights also. A typical fishing unit consists of 80-200 bulbs arranged in a specially fabricated frame. Each frame is with three panels contains 10 bulbs (10X3=30 bulbs). There will be 4-6 such detachable frames in a single boat. Besides 10X3 bulb combination, 10X4, 6X3, 12X2, 7X4 panels are also common. LED bulbs (9W) of various brands, are used in the panel. Each panel consist of 270-360W and entire fishing unit is having a power of 1000-1500W. A single bulb cost around 70-120 INR. Generators are used for power supply and illumination of bulb. Besides Jaleshwar, Dhamlej, Hirakot and Rupen are the major light fishing locations of the Saurashtra coast. In Rupen bandar of Devbhoomi Dwarka district, we observed big unit of light fishing boat fitted with 2340 W lights (Fig.3).

As the light assisted fishing is seasonal, additional investment is required for purchasing bulb, illuminating energy source, and fishing gear (cast net, scoop net) Table 2. The same fleet used for gillnetting are used in light fishing also. The operational cost is 1000-4000 INR per day and the average catch ranged from 20-500kg/trip. The profit depends on the catch rate and ranges from 2000-15,000 INR per trip. As the

fishing is mainly conducted in the near shore water, fuel required for this fishing is comparatively less. The total profit is divided into two parts and 40-60% goes to fishermen which then divide among themselves and the remaining goes to the boat owner. Some part of the profit is used for the maintenance of vessel.

In India, squid rank next to shrimp as the most crucial seafood for export. Cephalopods are actively fished in the artisanal fishery with highly selective gears and fishing methods (Reid et al., 2005). Hooks, jigs, trawls, various types of seines, traps, dol nets, and spears are the gears used for the exploitation of cephalopods in Indian waters (Rao, 1954., Lazarus and Achil,1984, Nair, 1985, Silas, 1985, Joel and Ebenezer., 1987, Rao, 1996, Sasikumar et al.,2006., Venkatesan and Shanmugavel, 2008.,Sundaram & Sawant, 2013, Muniyapillai et al., 2016). There are very few records on the use of cast net and scoop net

Table : 2 Details of additional investment required for setting up a typical light fishing unit.

	Unit cost	Total
Generator	15000	15000
Cost of bulb	70	8400
Bulb holder	30	3600
Frame fabrication charge	1000	4000
Wire, switch, etc.	-	500
Cast net	2000	6000
Scoop net	200	400
TOTAL (INR)	-	37900

for harvesting squids. In 1978, there was a report on the mass harvest of male squids using cast net and scoop nets along the Alleppy coast of Kerala (Meiyappan and Mohamed, 2003). Cast nets are the simple, oldest, and widely operated fishing gear both in marine and inland sector for harvesting the fishes inhabits the shallow water or with schooling behavior. The fishing is confined to specific area where the net is operated. There are reports of light assisted fishery of squids and cuttlefish with other fishing gears. The major advantages of light assisted squid fishing of Saurashtra coast are, the fishery promises comparatively less fishing effort with higher catch. As the fishing is seasonal nature, there is an overall

reduction in fishing efforts. Only cast net and scoop nets are used in the fishery which ensure fishing in a responsible way.

Spawning of squids is observed throw-out the year and coastal aggregation of large number of male individuals are reported along the south west coast and vulnerable for exploitation (Meiyappan and Mohamed, 2003). The females may move to the deeper water for egg laying. In the present study, only technological aspects of light assisted squid fishing is discussed. More investigation and a full seasonal study on the catch composition and biology of the catch is suggested to get full information and impact of light fishing.



Fig.1 View of a typical light assisted fishing unit of Jaleshwar, Veraval, Gujarat



Fig.2 Fitting light panels to the vessels.



Fig.3 Larger light fishing units of Rupen bandar, Devbhoomi Dwaraka, Gujarat

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