

Ginger Prawn Fishery in Gulf of Kutch: A Seasonal Livelihood for the Traditional Fishermen

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Abstract

*Seasonal fishery of *Metapenaeus kutchensis* (ginger prawn) is a significant source of livelihood for the socioeconomically backward part-time fishermen in the Gulf of Kutch region in India. During the southwest monsoon, a temporary but highly productive estuarine condition is created which provides nursery ground for various species of fish and shellfish in the little Rann of Kutch. A large number of prawn postlarvae migrate into the region and provide a short time opportunity to the fishermen for maximum exploitation of the fishery by the use of traditional gears like 'Gunja' and 'Katar jaal' and crafts like 'Odie'. This traditional fishery is also known as 'Pagadia fishery' when fishermen do the entire fishing operation without the use of 'Odie'. The sampling study of three selected sites, viz., Surajbari, Madherkhi, and Tikar revealed an annual turnover of around ₹ 200 million during a short fishing period of two months (August–September). The fishermen involved in the fishery are part-time fishermen as they spend the major part of their life as laborers in the salt pans and adjacent cement factories. The short-term ginger prawn fishery renders them a huge economic opportunity and decides the monetary fate of the family for the rest of the year. However, this irrational overfishing of the juveniles can lead to a complete collapse of the fishery due to the decrease of spawning stock biomass. This can severely disturb the livelihood opportunity of these fishermen and hence proper awareness among the fishermen is presently required. Introduction of alternative livelihood options like cage and pen culture techniques, product diversification, and value addition techniques as well as establishment of proper marketing channel can improve the situation.*

The Gulf of Kutch situated in the northwest corner of India and spread over an area of 7300 km² is considered a highly productive and diversified ecosystem along the western coast of Gujarat. The southern coastal belt of Kutch has a network of islands and inlets covered with mangroves and surrounded by

coral reefs whereas the northern region with numerous creeks and rivulets sustains large stretches of mangroves and mud flats having abundant resources of shrimp, fin fishes, sponges, corals, and algae. The Gulf of Kutch has an intertidal zone which expands 2 km towards the upstream and harbors the

diversity of ecosystems including sandy beaches, rocky shore, mud flats, sea grass belts, salt marshes, and mangroves. During the dry season the salinity reaches even up to 50‰ in some areas and in the monsoon season fresh water from adjacent rivers dilutes the network of creeks and alluvial marshy tidal flats. This ecosystem provides a congenial habitat for the delicate juvenile stage of most of the aquatic animals and thus large-scale migration of fish and shrimp juveniles takes place soon after the beginning of monsoon. A brief description about the prawn species diversity, their distribution as well as fishery in the Gulf of Kutch has been given by Ramamurthy (1963, 1967). According to Ramamurthy, prawns fishery contributes about 60% to the total marine fish production of the region. Among the prawn species, the ginger prawn *Metapenaeus kutchensis* (George *et al.*, 1963) constitutes a remunerative fishery to the traditional fishermen in the Gulf of Kutch region.

A brief history

The Gulf of Kutch has been endowed with many living marine resources of which prawn constitutes a major fishery in the region. However, the exploitation of this resource at commercial scale started only after the introduction of bottom trawls during the middle of the 20th century. Prior to this, the resource was exploited in the traditional way by using bag nets made of natural fibers like cotton, coconut coir ropes, hemp, etc. The history of this traditional fishing can be traced back to the early 16th century during the Mughal dynasty when the Muslim fishermen were

engaged in fishing only for sustenance. The casting and retrieval of the fishing nets were done manually barefoot without use of any crafts. This popular way of fishing was called 'Pagadia fishing' as the entire fishing operation was conducted on foot. 'Pagadia fishing' is in practice even today by the traditional fishermen of this region. Then keel-less wooden fishing boat called 'Odie' was used which increased the fishing area. The introduction of synthetic fibers such as nylon during 1960s revolutionized the fishing sector and even the traditional fishing gears are now made up of these synthetic fibers. As the adult prawns are bottom dwelling in nature and distributed offshore, the juvenile prawns constituted the major part of the fishery. The prawns dominated in the catch were *Metapenaeus monoceros*, *Metapenaeus kutchensis*, *Metapenaeus brevicornis*, *Metapenaeus affinis*, *Parapenaeus sculptilis*, and *Penaeus indicus*. *Metapenaeus kutchensis* (ginger prawn) was for the first time identified and named by PC George, MJ George, and P Vedavyasa Rao in 1963. Prior to this it was misclassified as *M. monoceros* or *M. affinis*. During 1980s when trawl fishery started gaining momentum, it opened new avenues for ginger prawn in the domestic as well as international markets.

Method of observation

The data for the ginger prawn fishery was analyzed at the Veraval Regional Centre, Central Marine Fisheries Research Institute (CMFRI), Gujarat. The juvenile shrimp landing sites, Madherkhi, Surajbari, and Tikar of Kutch region (Fig. 1) were visited monthly from August to October 2010 for observation

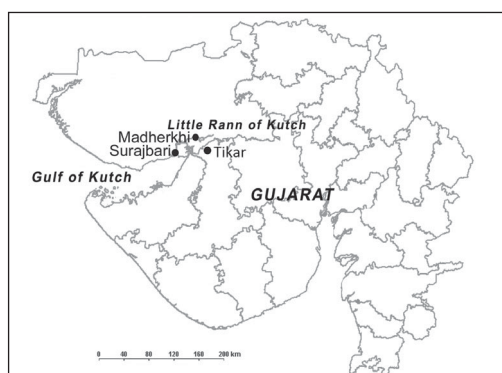


Figure 1. Map showing the fishing area and data collection sites in Kutch region.

and collection of the data. The fishery details such as number of families, active fishermen, catch, catch rate, total catch, and their value for two months (August–September) are presented in Table 1.

Zoology of ginger prawn

Though *M. kutchensis* resembles *M. monoceros* and *M. affinis* in many of the morphological characteristics, it has some different characteristics which makes it a distinct species (George *et al.*, 1963). However, often due to confusing morphological characteristics *M. kutchensis* is wrongly classified as *M. monoceros*

and *M. affinis*. Some of the characteristics which distinguish this species from the other two species are: mid-dorsal abdominal carination for *M. kutchensis* starts from the fourth segment while for *M. monoceros* and *M. affinis*, carination commences from the second segment. The genital structure also varies to some extent and the fifth walking leg is comparatively shorter in *M. kutchensis*. The adult shrimps, especially the females, are pinkish and exported as ‘red’ or ‘pink’ medium, which command a good price in overseas markets. However, the juveniles of the species are unattractive, muddy, and called ‘Surajbari’ prawns, as the fish processing units in Gujarat procure them from Surajbari and after salt blanching and drying these are usually used for domestic consumption. The prawn is carnivorous in feeding behavior and mainly feeds on polychaetes, *Acetes* spp., foraminifers, small fishes, crustaceans, cephalopods, and detritus. The male and female shrimps become physiologically mature after attaining a size of 103 mm and 135 mm respectively and the fecundity of female ranges between 0.38 and 0.57 million eggs (Deshmukh, 2006). According to Deshmukh (2006), though the shrimp spawns during December to August at

Table 1. Ginger prawn catch by fishermen during August–September 2010 at three sites in Kutch.

Location	Fishermen families	Active fishermen	Catch rate (kg man-day ⁻¹)	Total catch (tons day ⁻¹)	Total catch (tons)	Price (₹ kg ⁻¹)	Value (₹ million)
Madherkhi	103	400	35	14	840	70	58.8
Surajbari	229	450	40	18	1080	85	91.8
Tikar	121	300	35	10.5	630	85	53.6

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bimonthly intervals, the spawning prior to monsoon and during monsoon is considered as critical as it helps in the major recruitment to the fishery stock.

Fishing area and season

The ginger prawn, *M. kutchensis*, an endemic species of the Gulf of Kutch, is not only exploited as a commercially important prawn by the trawls but also as livelihood by the traditional fishermen of the region. After the onset of monsoon, the prawn juveniles sustain a seasonal traditional fishery in the Gulf of Kutch (Deshmukh, 1975) and little Rann of Kutch (Sarvaiya, 1978; Rao, 1983) region whereas the surviving adults migrate back into the sea and contribute to the commercial trawl fishery all year round in the Kutch region (Kagwade, 1967). The little Rann of Kutch has an area of approximately 3000 km². However, the prawn fishery exists only in the southern 1,200 km² area. The little Rann remains dry throughout the year except during the monsoon. With the onset of southwest monsoon, in the last week of June, the rivers such as the Banas, the Rupan, the Bambhan, and the Machchu with their rivulets and tributaries discharge fresh water in the little Rann (Rao, 1983). By the middle of July, generally, the Rann gets flooded due to

intense monsoon precipitation. During this period the little Rann gets connected to the Gulf of Kutch and thus facilitates the entry for fish and prawn juveniles into the Rann. This provides a suitable environmental condition and juvenile prawns migrate in large numbers to this newly created estuarine ecosystem. It also provides a lucrative opportunity for traditional prawn fishery (Fig. 2a) which starts in July and continues till the end of October. However, the residual juveniles which migrate to the sea grow as sub-adults and adults contributing to the trawl fishery in the Kutch region (Kagwade, 1967) and at the mouth of the Gulf of Kutch (Joseph and Soni, 1990). The processing plant owners and other buyers congregate at the above landing centers to procure them for export.

Study sites

Madherkhi

Madherkhi is a coastal belt at a distance of about 35 km from Malia. The coastal area is bordered by shrubby forest to a large extent. The shallow area with fine muddy bottom and peculiar physicochemical conditions extending for several kilometers seems to be highly conducive for the larval development, growth, and large-scale production of juvenile shrimp in this locality. Soon after the onset of monsoon,

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the fishermen and their families in the adjacent villages abandon their houses and migrate with their belongings to the areas of Madherkhi. In Madherkhi, about 103 temporary huts were constructed by these migrated fishermen. In total, about 400 fishermen actively participated in the fishery. The average catch rate was 35 kg per man-day and in total 14 tons were collected in a day. During the fishing season an estimated catch of 840 tons was harvested from the area (Table 1).

Tikar

Tikar is a shallow expanded area with a network of estuarine conditions having loose muddy bottom, which provides a suitable ground for the growth of juvenile shrimp. A good rainfall in Kutch causes flooding and large-scale immigration of postlarvae in this area and other adjoining creeks where they rapidly grow into juveniles. Discontinuous rains make shrimps to get land-locked restricting the emigration of juveniles into the gulf and support a seasonal fishery. As in Madherkhi, soon after monsoon fishermen from adjacent villages migrate into the area of Tikar with their belongings in the pursuit of a lucrative fishery. In Tikar, about 121 temporary huts were constructed. In total, 300 fishermen actively participated in the fishery. The catch rate was 35 kg per man-day and in total 10.5 tons were collected in a single fishing day. In Tikar, the total catch was estimated to be 630 tons during the fishing season (Table 1).

Surajbari

Surajbari is a small village situated on the northern bank of Hadakiya creek. Unlike

Madherkhi and Tikar, the fishermen in this village are not migratory in nature. They mainly depend on fishing for their livelihood and use stake nets for the fishery. The nets are set in a series during the low tide. When the tide is high the migratory nature of shrimp leads them straight into the net. There were about 229 fishermen families in the village and 450 fishermen actively participated in the fishery. The catch rate was 40 kg per man-day and in total 18 tons were collected in a day. In Surajbari the total catch was estimated to be 1080 tons during the fishing season (Table 1).

Fishing craft and gear

The craft used in the fisheries is a Malia type of plank-built ribbed boat locally known as 'Odie' (Fig. 2b). To facilitate easy beaching on the estuarine mud, the bottom of the boat is flat. The bag net, locally known as 'Gunja' is used for catching the prawn (Fig. 2c). The 'Gunja' has a square mouth and it gradually tapers, as a cone, to an opening at the end. The 'Gunjas' are operated both as passive and active gear. When the 'Gunjas' are used as passive gear they are just set against the tide. The 'Gunjas' are also used as a drag net in which two fishermen hold the sticks that are tied to the sides of the net and drag the net along the bottom. A series of 'Gunjas' is set against the outgoing tidal flow to catch the shrimp juveniles. Scissor net, a modified stake net, which is locally known as 'Katar jaal' (Fig. 2d) is also used in the area free from strong current. Often these 'Gunjas' and 'Katar jaal' are operated without the 'Odies'. Fishermen set these gears in the shallow areas by entering into the water barefoot, locally called 'Pag' and hence this is called 'Pagadia fishery'.



Figure 2. Craft and gears used in the fisheries: (a) Juvenile ginger prawn catch; (b) Traditional fishing craft 'Odie'; (c) Bag nets or 'Gunjas' in operation; and (d) Scissor net or 'Katar jaal' in operation.

Discussion

The Gulf of Kutch well renowned as one of the biggest natural repository of biodiversity is also considered as a highly productive ground for fisheries along the northwest coast of India. Fishery, which is considered as one of the major livelihood activities for fishermen, not only meets the food security of the region but also provides many auxiliary employment opportunities for the people. Though the region is bestowed with many fishery resources, prawn resources play a major role due to their lucrative demand both at the domestic

and international markets. Among prawn resources, ginger prawn (*M. kutchensis*) plays a significant role because of its peculiar nature. The ginger prawn fishery is unique in nature mainly because of three reasons. These are:

1. The fishery is endemic to the Kutch region only.
2. It mainly involves the exploitation of juveniles on a mass scale.
3. It is highly seasonal and lasts only for two months (August–September).

The ginger prawn, *Metapenaeus kutchensis*, an endemic species of the Gulf of Kutch, is not only exploited as a commercially important prawn by the trawls but also as livelihood by the traditional fishermen of the region.

The critical factor which regulates the fishery is the right amount of rainfall at the right time. Little deviance in the monsoon time as well as precipitation level can result in failure of the fisheries. The little Rann of Kutch serves as a nursery ground for the prawn juveniles and sustains the ginger prawn fisheries in the entire Gulf of Kutch. The area remains dry throughout the year except during the monsoon period (July–September). With the arrival of monsoon the little Rann of Kutch gets connected to the sea and the flow of fresh water rivers and sea water establishes a productive estuarine condition which acts as nursery ground for the postlarvae and juveniles of *M. kutchensis*. Millions of matured *M. kutchensis* actively participate in the mating process just prior to the arrival of monsoon so as to make the next generation ready for the estuarine condition created at the little Rann of Kutch and to provide natural protection from the unwanted predators as it remains secluded from the main sea. The prawns grow rapidly in this productive habitat during August and September and before the monsoon ends they escape from the little Rann of Kutch which becomes entirely isolated from the main sea due to the decrease of riverine water inflow. These prawns sustain the trawl fisheries of ginger prawn in the entire

Gulf of Kutch throughout the year. The enormous influx of ginger prawn juveniles creates a great opportunity for the fisher folk near the little Rann of Kutch. This opportunity had been exploited since time immemorial. The fishermen who exploit the fisheries are neither local residents of the area nor full time fishermen. These people are mostly uneducated, socioeconomically backward, and adopt other livelihood options; for example, they work as laborers in the salt pans. They come back to the fisheries ground only for two months during August–September to participate in the fisheries. The fishing time is considered as a key opportunity which decides the family's future for the rest of the year. This creates a great race and competition to exploit the resource for maximal benefit. The code of conduct for the responsible fisheries is often ignored in the rush of fishery. The juveniles are exploited at their maximum using primitive gears like traditional stake nets and are hot blanched in boiling brine (Fig. 3). After blanching and drying they are sealed in polythene pouches and distributed to different parts of India by the marketing agents. These juveniles of ginger prawn do not fetch good price unlike their adult counterparts and are only used for domestic consumption.

During the fishing season, a total revenue of ₹ 200 million was realized from these areas. However, the irrational exploitation can lead to the depletion of spawning stock biomass due to gross overfishing and eventual failure of the fisheries. Therefore, proper awareness should be created among the fishermen about the rational utilization of the resource. One of the better solutions to this imminent future



Figure 3. Processing of juvenile ginger prawns: (left) a woman using the traditional method; and (right) processed prawns ready for packaging.

crisis is a paradigm shift from the capture practice to culture practice. The capture-based aquaculture can be adopted for the optimization of the yield of this resource. During targeted fishing many juveniles of high-valued fishes are caught which are usually discarded or used for fish meal or sold for a much lower price unlike matured ones as they do not fetch good market price. The capture-based aquaculture is a newly growing concept in which these juveniles (after capture) are cultured for a short period until they attain a marketable size and at this size they fetch a very good price. This is a value addition process which not only provides a new source of earning but also helps indirectly in resource conservation. It has already been tested that the culture of *M. kutchensis* as a short-term crop can increase the price of the prawn by 30–40% compared to the captured prawns (Gopalakrishnan and Raju, 1990). Open water cage culture and pen culture demonstrations of this candidate species can attract the fishermen and diffusion of the culture technique by extension

agencies can revolutionize the farming process. Constitution of fishermen self-help groups (SHGs), long-term lease of the land at affordable rental to these SHGs, low interest loans, and subsidies can help in the easy adaptation of these culture techniques. At the same time research and development efforts should be concentrated on value addition and increase in shelf-life of the catch by the use of locally available ingredients. Development of proper marketing channel can be helpful for the economic upliftment of the fishermen at the ground level. The fishermen are socioeconomically backward and often illiterate. The villages lack proper sanitary facility, good roads, primary healthcare centers, and education facility. Proper implementation of various fishermen welfare schemes can improve their condition.

The little Rann of Kutch serves as a nursery ground for the prawn juveniles and sustains the ginger prawn fisheries in the entire Gulf of Kutch.

Conclusion

Metapenaeus kutchensis, popularly known as ginger prawn, is a key species in the Gulf of Kutch and the livelihood opportunity provided by the fishery of this species is really significant and directly related to the socioeconomic status of the fishermen. The employment opportunity generated by juvenile fishery of this single species is tremendous. However, the irrational exploitation can lead to the depletion of the stock of this wonderful species in the future and can further lead to a chaotic situation as it is the ultimate livelihood for many people in this area. Therefore, proper awareness program for the rational exploitation of the species, aquaculture diversification, proper postharvesting technique, establishment of marketing channel, and implementation of welfare schemes can bring a better prosperous future for the people in this area.

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