



*International Journal of Current Research
and Academic Review*

ISSN: 2347-3215 Volume 2 Number 7 (July-2014) pp. 101-112

www.ijcrar.com



Traditional knowledge of fish and prawn feeding behavior and its application by fishermen for successful fishing in river Godavari in South Central India

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KEYWORDS

ITK,
Fish Behavior,
Godavari
River,
Fishing

A B S T R A C T

Besides the research and information available on feeding behavior of fishes and Crustaceans the traditional knowledge of fisher communities from Godavari river basin of South-Central Maharashtra State, India is quite useful for them in successful fishing with little efforts, most accuracy in species specific catch and high success rate of catch. Study was conducted through interviews of 70 fisher tribes experienced in fishing from 18 different fishing sites about 5-9- km from Nanded as a district headquarter. The fish species and prawn species have a specific time of feeding and every species apply a typical strategy during feeding which is well known to fisher communities living in the river basin area. This traditional knowledge they pass to their next generation through the fishing practice of new generation with experienced members together in the community. First time this kind of traditional knowledge is documented which may be useful in modernizing the fishing gears, increasing the fish catch, to decrease the fish catch efforts, sustainable use of fisheries resource and to implement the conservation strategy of fisheries resource of the region. It is an important contribution to add a new data for getting success in fishing.

Introduction

Food is one of the prime need of every creature in any ecosystem. Aquatic ecosystem is one of the most complex ecosystem on the earth. River as an ecosystem, there is dependence of animals on each other for their food need that results in to food chains in ecosystem. Godavari River is commonly named as 'Dakshin

Ganga' i. e. river Ganges of Southern India forming one of the main river basins in India. The river Godavari flow West-East, originate in Bhimashankar mountain ranges near Trimbakeshwar-Nashik (Fig. 1) in Maharashtra and pass through parts of Maharashtra State (Marathwada) and Andhra Pradesh then merge in to Bay of

Bengal (Fig.1). About 10,000 traditional fisher populations from Marathwada region till depend on the fishing activities for their livelihood. After spending many years in fishing activities in the river they have acquired detailed knowledge about the number of fish species and their behaviors. Much work has been done on overall biology of fishes from Marathwada region but almost no work on the feeding behavior of fishes and its relation for success in fishing from this region as a traditional knowledge (Shrivastava *et al.*, 2002; Rathakrishnan *et al.*, 2009). The study will be useful for preventing the over exploitation of natural fish resources, in the fish biology research to get the fish samples for the conservational study of natural resources (Mohiuddin and Alam, 2011).

Materials and Methods

To determine the different feeding habits and feeding strategies adapted by various fish species and how the fishermen from this region use this traditional knowledge in fishing 18 different fishing sites in the villages along river Godavari located about 5-90 km. from the district headquarter Nanded were visited during the year 2012-2013. The interviews of individual or group of fishermen were conducted of age group between 14-70 years. 60 men and 10 women members from the communities were selected as experienced fishers for discussions and individual interviewed to determine the traditional knowledge of feeding behavior and its application for successful fishing. The details of fish species in the catch, the type of fishing gear they use, the time for fishing they choose (early morning, afternoon, evening, night, before or after midnight) and the feeding behavior of various fish species (Table 1.) was discussed and noted during their interviews. Fishermen were personally

interviewed to determine these facts which were not reported earlier from this region. The information received from the fishermen about the feeding habits was confirmed by visiting the fishing sites. Gut contents of fish were analyzed by using Sedgwick-Rafter Counting cell and dissecting microscope (DV-4, Carl Zeiss Germany). The details of feeding behavior in the form of specific feeding strategy of some predatory fishes and other teleosts commonly found in their routine catch are explained in detail as per the opinion of fisher communities of this region.

Data was recorded by means of semi-structured interviews and through the behavioral observations during the ethnographic data collection techniques (Slater *et al.*, 1978). A free and informed consent form was read out and made available to those who participated in the study. The interviews were recorded using digital recorders and later transcribed for the analysis. The photographs of the fish species were distributed to the local fishermen to determine the local name of fish species and their feeding behavior. The type of net used by the local fisher communities to catch the fish species in river Godavari was observed. Local information provided by the participants was compared with those from the specialized academic literature. Based on the synchronic and diachronic interviews, the control were performed through the verification tests of consistency and validity of responses. All the ethnographic material (recordings, transcriptions, field notes and photographs) is stored at the fisheries and Aquatic Parasitology Research Laboratory, Department of Zoology, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded-431606, MS, India. The specimens collected were processed and identified by Dr. S. P. Chavan, Associate Professor, School of Life

Sciences of this University by referring the Fish Data base by Froese and Pauly (2014) to the lowest possible taxonomic level and afterwards stored in the Zoology Museum of the University.

Study area

Fishing centers located near 18 different villages on the bank of river Godavari were visited along 160 km of the river in Marathwada region of South Central Maharashtra State (Fig.1.).

Results and Discussion

Indigenous traditional knowledge of fishermen about feeding behavior especially feeding strategy of fish species in river Godavari and its tributaries was recorded during the study is as given below.

1. *Wallago attu* (Bloch & Schneider, 1801)

Wallago attu is one of the widely distributed silurid in fresh water habitat of Asian subcontinent including India, Pakistan, Bangladesh, Sri Lanka, Bangladesh, Bhutan, Nepal (Froese and Pauly, 2014; Jhingran, 1999). *Wallago attu* is an active and effective predatory fish. It has maximum total length (MTL) of body 3.0 m and total body weight 60-70 kg. It feed on small to large fishes in its habitat, it also represent cannibalism. It has highly extensible, sac like stomach and short intestine. Fishermen reported that as like many predatory teleosts it regurgitate the undigested bones of it's pray. *Wallago attu* feeds up on variety of food items (Babare *et al.*, 2013) the food of this fish mainly comprises the weed fishes like *Chela phulo*, *Puntius ticto*, *Ambasis sp.* etc. (Table 1.) (Babare *et al.*, 2013). There was no any supplementary or accidental food in the form of algae, plankton or detritus in the gut content analyzed

indicating that it is strictly predatory fish but occasionally scavengerous. The larvae of teleosts in the habitat, river prawn species and cannibalism of its own juveniles was also found in the stomach content of this fish. When the domestic buffalo (*Bubalus bubalo*) enter in the river for a cold dip and to drink water, the buffalo defecate dung, the cattle dung was also found in the gut content of this species, and hence it is also an occasional caprophagous. It was also observed that, *Wallago attu* attack the shoals of small fish group of *Chela phulo*, *Chela chela*, *Chela bakaila*, *Puntius ticto*, *Rohtee vigorsi*, *Rohtee cotio*, *Rhinomugil cephalus*.

In the process of chasing the individuals in a group or any single isolate moving fish species it may come to the coastal region of a river or may go deep in to the stagnant water pool of the river. Another remarkable finding by the fishermen with their keen observation is when this active predatory fish unable to get the prey then it doesn't feed upon anything easily available in plenty in its surrounding like organic detritus, Molluscs on bottom of a water body. In such a food scarcity and unavailability situation it fill up the stomach sac with only water (observed in gut content analysis) and whenever it get the food then vomit the water immediately. In a remarkable hunting strategy *Wallago attu* use to produce a specific cracking and hitting sound with the help of its flexible tail region as a tail slap to produce this sound. The fish reach about 30-40 m distance in a deep connected or isolated pool formed in the river flow and return immediately opposite in direction to area where tail slap sound was produced and cross about 60-80 m distance immediately to acquire a hunting position in the way of fishes which frighten due to the cracking hitting sound produced by this fish. The escaping prey fish easily get fall in to the wide mouth of *Wallago attu*. This is a very

specific hunting strategy adapted by any predatory teleost from river ecosystem up till now reported. This kind of feeding behavior was recently reported in case of a shark species by Oliver et al. (2014) that the thresher shark species (*Alopius pilagicus*) of Piscadore islands, Philippines use tail slap as a hunting strategy. This shark species enter in to a bait ball of sardine fishes and produce a tail slap to debilitate 1-2 sardines and immediately reach to down side the sinking sardines due to tail slap to catch in mouth easily. Whereas in the present report from fishermen, *Wallago attu* produce a tail slap but not to hit the members of shoal of its food fishes but the sound produced by tail slap act as a threaten alarm and the shoal members swim away from the area of sound produced and get trapped in the wide mouth of *Wallago attu*. In this hunting process *Wallago attu* take its position on the way of escape of prey fishes. It was a very crucial and remarkable observation of fishermen on the behavior of this common predatory fish found almost in all the rivers and reservoirs all over India to locate and catch it easily. There was no any specific feeding time in a day or night for this predatory fish, it was observed by the fishermen that, it feed during early morning, evening, mid-day or at mid-night. The fishermen are very much aware of this feeding strategy of *Wallago attu* hence they fix the gill net (6-8 cm mesh) in its habitat where the chances of getting trapped this predator are very high nearby the area of tail slap sound was produced. Actually here the predator applies a specific hunting strategy (Chaturvedi, 1956) but itself get trapped in to the nets of fishermen.

To catch this fish is most easy task for the experienced fishermen because of understanding its feeding behavior. It was reported by an experienced fisherman (95 %) that, the fish may be possible only to get

trapped in the gill-net or in the hook line baited with live tadpole of common bull frog *Rana tigrina*. This fish species also can be attracted to a hook with rotten visceral organs of poultry, cattle liver, beef (Dutta *et al.*, 2009) or *Channa species* of fish or a cricket insect for easy fishing.

***2.Sperata seenghala* (Sykes, 1839)**

Sperata seenghala (Sykes, 1839) is one of the common fish found in river Godavari. It has been reported that it is predominantly predatory but also feed on 2-3% algae (Babare *et al.*, 2013). It is nocturnal feeder. During day time it rests on the silt at cold and dark bottom of stagnant water pools in the river at 5-8 ft depth. This slow moving predator mostly feed on dead fishes and other organic detritus on the bottom of habitat. it emerge out from the deep bottom region of the habitat to the coastal shallow area of a water body or river for predation. It approach the small size weed fishes, frog species (*Rana tigrina*) by slow and calm swimming movements by keeping its spatula like mouth open and suddenly it close its mouth to engulf the prey food items. Therefore shallow coastal area is the feeding habitat of this fish where its prey use to rest during night. The feeding time of this fish is at night from 22.00- 24.00 hrs. and early morning 4.00 - 6.00 hrs. It was also observed that, *Sperata seenghala* do not migrate for long distance for feeding as like random and long distance migratory fish *Wallago attu* in the same habitat. It was a long term observation of experienced fishermen living in this region that *S. seenghala* need continuous feeding. It do not keep the stomach empty though the fish has tough and powerful jaws of spatulate form mouth but it unable to breakup and crush the bones of its prey hence it regurgitate and vomit the undigested bones and large scales while the muscles of prey get digested.

All these details about the feeding ecology and behavior of fish are well known to the local fishermen due to their careful observations and a routine part of fishing. Hence to fix the nets to trap this fish is most easy task for them. *Sperata seenghala* prepare a small depression like nest on the bottom of river in a area with sand and small gravel and rock pieces. The fishermen also share the information that the nest of *S. seenghala* is used to rest during day time if the water level of the habitat is 5-8 ft and if the water level is more than 8 ft and above then it rest only during night.

3. *Silonia childreni* (Sykes, 1839)

It has various local names as ‘Begdi’, ‘Chudwal’ and ‘Dharparas’. It is a silurid, planktophagus common teleost found in river Godavari. It use two different habitats in the river like coastal water and interior deep water. It come towards surface area to feed upon the plankton and the drifted dead or live ants reached in to river through flood during monsoon (June- September) and also throughout year by various means like falling from coastal tree branches, drifted by winds etc. It has nocturnal feeding time between sunset and before midnight. For feeding they move in group or shoal containing about 100-115 individuals. The body smell of this fish in both sexes of all size groups (10-200 gm) was similar to kerosene smell. Due to the kerosene smell to its body other predatory fishes avoid to feed upon this species except *Wallago attu*. It was observed that, this specific body smell is concentrated in to the head tissue only but not in body muscles.

Interestingly it was observed that, when this fish is consumed by preparing any recipe then the consumer undergoes lethargic body activities and may go for long time sleeping hence it is a matter of investigation that,

what biochemical compositions present in this species for causing such effect on human body. Monsoon season is the peak fishing season in the rivers to catch the reverse migrating fish *Catla catla* opposite to direction of the river flow, in the same season the *Silonia childreni* found associated in migration process with the *Catla catla*. The fishermen know about the consequences they face after consumption of *C. childreni* hence they avoid to feed on it and they remain engaged actively to catch the large amount of *Catla catla*. The main predator of *S. childreni* is *Wallago attu*. The species name *S. childreni* probably has been given to this species because it produce noise like crying sound of a child when it gets tapped in the small mesh nets (Knight fabric net of 2 mm mesh). When *S. childreni* in large number get trapped in the Knight fabric nets the sound they produce was generated by crushing the bones of pectoral girdle and pectoral fin spine of hard cerate margin type. when one of the top predatory fish like *Wallago attu* hear the sound of these fishes then it move towards the net and it also get trapped in this bag type of net. *S. childreni* is the only major fish species trapped in large quantity in the form of a shoal containing 1000-1200 individuals of total body weight of a shoal 40-50 kg in the bag nets and gill nets during monsoon. Once this fish get migrated from reservoir in to river during monsoon then it doesn’t migrate back to the reservoir. Due to damage of nets, wounds to fishermen from the pectoral fin spine during catch and kerosene smell of body it is not a favorite fish to catch though it is available in plenty during monsoon in Godavari river basin of this region.

4. *Notopterus kaporat* (Pallas, 1769)

It is one of the common predatory teleost found in the weedy and rocky places in the muddy, deep bottom of river at about 5-7 ft

depth. It is diurnal feeder. It apply a typical feeding strategy in which it produce slime mixed air bubbles which reach on to the water surface. Towards these bubbles the adult black or yellow tail dragon flies (Anisoptera-Gomphidae-Club tails) get attracted and found to sit on these bubbles. *Notopterus* residing down to the air bubbles immediately catch the legs of dragon fly and drag in to the water and engulf. The fact was supported by the field observations by the local fishermen and gut content analysis. The occurrence of air bubbles on the river water surface is an indication of presence of *Notopterus kaporat* hence accordingly the fishermen use the net and gears to catch them. If *Notopterus kaporat* is not getting the food it drinks the water same as *Wallago attu* do this practice routinely and whenever it gets the food then vomits the water. This fish species also show migration to the areas where the bottom has rough surface with large gravels and medium to large irregular stones and rock pieces. It shows the shoaling or group behavior during feeding. To catch this species fishermen use the cast net.

5. *Rhinomugil cephalus* (Linnaeus, 1758)

Rhinomugil cephalus is commonly known in local Marathi (Maharashtra) language as 'Wardoli or 'Rocket fish'. It is found in the Godavari river and its tributaries. Very interesting aspect of feeding behavior of this teleost from river Godavari is that, the fish has out pushed eyes hence it can rotate the eyeball comparatively in wide angle as compared to other common teleost like carps and weed fishes. Due to this type of structural peculiarities the fish remain in water but it can keep the eyes above the water surface hence it can see the activities on water surface as like crocodile do. In any danger it sink in to water and escape or in the unavoidable obstacle or problem, it jump above the water surface for short distance up

to few ft. like a gliding fish *Cipsilurus sp.* jump up to 100 ft in the sea. The out pushed eyes and jaw bones act as hook like structures on both sides of the mouth opening are the structures enables them to get trapped in the gill nets. The feeding strategy of this fish is, it moves in a shoal of 20-30 and the shoal move from deep water to very shallow water of 1-2 ft for feeding along the coast of river and all the members of shoal sink to coastal bottom area and vigorously shake the mud and silt with their tail fin and feed up on whatever food items comes out in the form of detritus, insects, plankton in to the water column. The insects which fall in to the water in the coastal region forming in to a scum is also a food of this fish species. To catch this species fishermen use fixed gill net (50 ft. long X 6-7 ft. height having 2.0-2.5 cm mesh size). The net can be operated in open water across the flow of river or to encircle a region of river coast. To catch the jumping fishes after striking to net another similar gill net is fixed at 3-4 ft. distance from first net. The range of jump of this fish species is 3-4 ft only.

6. *Labeo calbasu* (Hamilton, 1822)

Labeo calbasu is a common teleost found in the river Godavari and its tributaries. It is a black coloured *Labeo* species hence species name is *calbasu*, it is locally named in Marathi language as 'Kalusi' meaning black colored fish. It has feeding time during day and night, at any time when it become hungry. Therefore it has no any specific time of feeding like other teleost. It inhabits in the rocky and weedy area in the river. It feed on phytoplankton and detritus (Babare *et al.*, 2013). Small size individuals (up to 200 gm body weight) found to move in a group of 30-50 numbers. The large size individuals of both sexes live individually. Floating gill net and cast nets are effective to catch this

species. At any time there are chances of trapping this fish.

7. *Catla catla* (Hamilton, 1822)

It is one of the common fish in river and reservoir ecosystems all over India, well known for fast growth and culturable value in the integrated fish farming of carp culture in Asia. It is surface feeder on plankton, especially zooplankton. Till large and become very large of body weight 20-40 kg. Live in a shoal of 10-200 numbers, they are usually in a pair of male and female fish 1:1 ratio. It feed during day and night time. As a surface feeder on free suspended plankton in the surface region of water, it does not search food and do not waste energy in searching food hence it is ready made feeder. The feeding strategy of this species is, it remain actively swimming in the surface zone, whatever turbulence produced by the bottom feeding fishes generate an excavation process of bottom that carries the detritus, plankton, small size aquatic insects and suspended food towards water surface, this is food of *Catla catla*. By filter feeding it feed up on this readymade food. Depending up on the size of fishes in a shoal the gill net of mesh size 5-15 cm is used to trap this fish. The fishermen are aware of feeding process of *Catla catla* hence they catch this species easily. Reverse migrating *Catla catla* from reservoirs in to the river against flood flow during monsoon is peak fishing time for this species as reported by majority of fisher tribes from this region.

8. *Channa marulius* (Hamilton, 1822)

Channa species are commonly called as Murrells. In the traditional local language they are called as 'Maral'. All the species of *Channa* found in coastal, weedy, shallow, turbid and murky water of river or reservoir. The food of this fish species consists of

fresh water gastropods, prawns, small fishes, fry and fingerlings of its own species and other fish species³. It is a cannibalistic feeder. It show parental care. The development of young fry stage of this species is carried near the mouth of parent fish (male or female) (Paray *et al.*, 2013). Both the sexes take care of young ones, but in the unavailability of food the male parents of this fish species feed on their own young ones. It show fighting behavior with other predatory fishes during parental care and feeding (Paray *et al.*, 2013). *Channa sp.* usually feed on small size pray include small insects, dragonfly nymphs and fry of fishes. Some times *Channa marulius* (Large spotted Murrells) when feed up on large fish or a bird like common egret (*Nycticorax nycticorax*) or night heron then it vomit the large size undigested bones, feathers, legs, beak, claws etc. It is active during day and night. All the species of *Channa* produce air bubbles on the water surface when they are in a weedy, shallow habitat with muddy bottom. Towards the bubbles on water surface, the dragon flies get attracted and the underlying *Channa* species drag the legs of this insects and feed. Therefore bubbles on water surface and flying dragon flies near the water surface are an indication of presence of *Channa sp.* In the habitat. Gill net of 3-8 cm mesh are used to trap the murrells in this region by the fishermen. The *Channa species* or 'Murrells' also trapped by drying the water bodies and easily hand picked (Paray *et al.*, 2013).

9. *Mastacembelus armatus* (Lacepede, 1800)

M. armatus is commonly known as fresh water eel or spiny eel having long, cylindrical body with 33-40 free spines of anterior part of dorsal fin (Froese and Pauly, 2014). The fish is active for feeding on the river bottom in the coastal region during

early morning while it rest in the deeper region of river on the bottom with stones and gravels. When it reach the coastal weedy area of river at about 1-2 ft depth then it moves vigorously in the weed resulting in to shaking of the weedy region due to the laterally compressed flexible tail and serpentine movement of this fish which leads to run away of small size river prawn species like *Macrobrachium lamerii* and *M. rosembergii* on which it feeds. After feeding is over at sunrise, the fish enter in to deeper strata of river to rest. Hence, this fish species can be trapped during early morning or sunrise in the gill nets of mesh size 3 – 4 cm.

10. *Rita jallah* (Hamilton, 1822)

Rita jallah is a small size bottom living predatory fish of body size 8 – 10 cm and body weight 20 – 25 gm. Body coloration is golden white on dorsal profile and ventrally it is whitish in color. It feed upon plankton, fry and fingerlings of other fishes in the river and gastropod snails³. Locally it is named as ‘Jallah’. With help of short, strong inward serrated pectoral spine by brushing on the lower jaw bones it produce a brushing sound when it enter in to coastal weedy area of 2-3 ft depth of river. Due to this sound by fish the river insects, river prawns emerge out from their habitat on the river bottom on which this fish species feed easily during early morning (4 a. m. to 6 a. m.); while in the deeper strata of river bottom at about 10-15 ft depth in the region with stones and gravel on the river bottom. It form a shoal of 150-200 individuals and continuously move in the same area of 5-10 sq ft in this movements they secrete excess of mucous from their body in to the surrounding water hence the water become turbid whitish in the shoal area of these fishes. Suspended large plankton, aquatic insect larvae, fish larvae and crustacean larvae get entangled in to the mucous and

the movement of these prey items get slow, which facilitate the *Rita jallah* shoal members to feed up on easily. Understanding of fishermen for this kind of feeding behavior of *R. Jallah* is an important aspect to use cast net and gill net (1-2 cm mesh) effectively to catch this species.

11. Weed fish species (*Chela phulo*, *Chela bakaila*, *Amblypharyngodon mola*, *Chand nama*, *Rohtee vigorsi*, *Rohtee ogilbi*, *Chanda bakaila*, *Puntius ticto*)

Weed fish are the category of fish species which found among the weedy places and usually they found in a large shoal of 1000 - 100000 individuals. These fishes contribute as one of the largest quantity in routine catch from river Godavari. The peak season of occurrence of larger shoals of fishes in the river is winter (October to February). The largest shoals occur in the stagnant pools in the river about 10-15 ft away from river coast and in the column region of 10-20 ft. depth. The shoal formed during day time consists of mixture of all the species, while the isolated shoals of *Amblypharyngodon mola* and *Chela species* were routinely observed during evening to late night (5.00 p.m. to 9.00 p.m.). The weed fishes are the common food for predatory fish species like *Wallago attu*, *Sperata seenghala* and *Channa species*. There is a sure chance to catch large fish near the shoal of weed fishes.

12. *Macrobrachium rosembergii* (De Man, 1879)

Macrobrachium rosembergii is one of the common fresh water large prawn found in the rivers and reservoirs of India. In river Godavari in the selected study area it was observed in deep water pools in the river flow, on the bottom with rock, gravel and stone.

Table.1 Fish species from Godavari river basin in south central Maharashtra and their feeding behavior Comparison between scientifically reported data and traditional knowledge of fishermen

Fish species	Feeding behavior reported in reference literature	Traditional knowledge of fishermen on feeding behavior
<i>Wallago attu</i>	Predatory	Predatory & frequently use tail slap sound to disguise the prey fish species.
<i>Sperata seenghala</i>	Predatory/omnivorous	Nocturnal predatory, come to coastal region for Feeding, rest in deep water during day.
<i>Notopterus kaporat</i>	Predatory	Predatory mainly on aquatic insects, use frequently air bubbles on water surface to attract flying insects like dragon fly.
<i>Rhinomugil cephalus</i>	Surface feeder, omnivorous	Omnivorous, use tail fin to shake coastal muddy area to excavate out the food items.
<i>Labeo calbasu</i>	Column feeder, herbivorous	Column feeder, fishes up to 150-200 gm move in shoal, larger move individually, day and night feeder, rest near stones in deeper water.
<i>Catla catla</i>	Surface feeder on Plankton	Zooplanktophagous and feed on available food excavated by bottom feeders.
<i>Channa species</i>	Bottom feeder	Presence of air bubbles and dragon flies on water surface is indication of <i>Channa sp.</i> , Cannablastic on young stages of its own and other fishes.
<i>Mastacembelus armatus</i>	Omnivorous	Predatory mainly on coastal insects and river prawns, prefer coastal weedy region & sunrise for feeding, rest in deeper region during day and night.
<i>Rita jallah</i>	Predatory	Shoal forming (15-200 in a shoal), secrete excessive mucous in water column to coagulate the movement of prey, inhabit in deep water with stones on bottom.

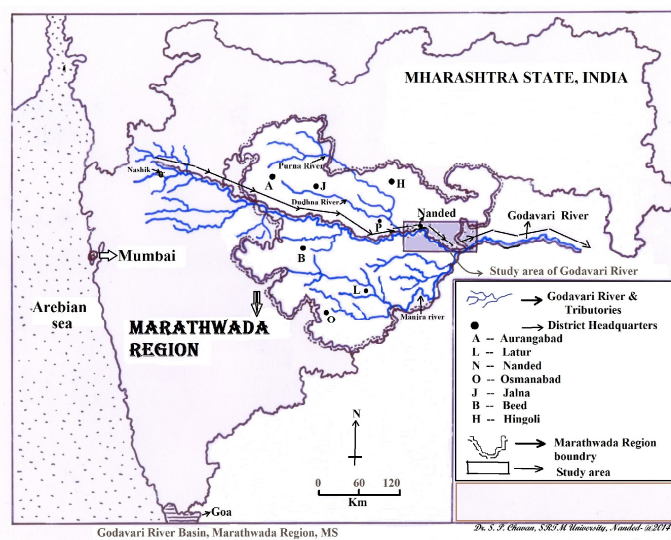


Fig.1 Study area: Godavari River basin Marathwada Region in South Central parts of Maharashtra State, India

It anchors chelate legs to these objects in the habitat. It has reddish yellow to faint yellow body color with blue, green color, two long second chelate legs of equal length, having 1.6 - 2.0 ft total length. It grow maximum 750-800 gm. The chelate legs also have high food value and market demand.

It is omnivorous prawn feeds on aquatic insects, algae, weed fish species including *Puntius ticto*, *Chela phulo*, *Rohtee vigorsi*, *Chanda nama* and fry, fingerlings of all fishes in the river. The feeding time of this prawn species is not specific, it was found feeding during day as well as night. It prefer to rest on the bottom while come to coastline of river for feeding, it do not prefer feeding in the column region of water. Usually it keep the chelate legs outside the coastal water while its body remain in the water. There are numerous sensory hairs of 1.0 to 1.5 cm long on the inner margin of the forceps like dactylus of both chelate legs. The dactylus is kept open, the lower part of dactylus has sensory hairs which is kept half buried in the coastal silt so that the sensory hairs remain free waving in the river water. The aquatic insects move randomly through the opened dactylus of the prawn and get attracted towards the sensory hair movements, the sensation of presence of insect is determined and the upper part of dactylus is suddenly clapped down to trap the insect which later on eaten. The expert fishermen who identify the stick like structures on the river coast which are chelate legs of prawn they catch the prawn easily by holding the chelate legs or by using a locally made cast net with mesh size 2-4 cm. Sometime it get trapped in the gill nets with their chelate legs. Fishermen usually apply the cast nets in the feeding grounds of this prawn to catch them (Rathkrishnan *et al.*, 2009; Murugnandam *et al.*, 2014). The rate of catch of this prawn species by hand picking of the chelate legs is

very low, because the water movements and the vibrations created in the river coast make the prawn aware of the surrounding and it escape in the deep water of river. Therefore use of cast net in the river to catch the *Macrobrachium rosenbergii* is common fishing practice in river Godavari. It was also observed that, in the scarcity of food in the water of habitat the prawn move outside the water and crawl on the grown in the grassy area with the help of pleopods and feed upon young leaves of coastal grass during night time especially when there is full moon light during all seasons of year. On the ground for movement the spinous telson is useful to burrow in the soil and to create a jerk-jump up to 2.0 to 3.0 ft long during escape and finally reach in to the river.

Conclusion

In recent time the modern fishing nets are used in commercial fishing in reservoirs (Ayyapan *et al.*, 2004; Gurumayum and Chaudhury, 2009) but the user fishermen of the nets are not aware of feeding behavior of fishes resulted in the catch of all age group of fishes including larval stages or fingerlings and small size fish. The reservoir lease owners suffers from heavy economic loss due to killing of young stages of all stalked fish species. Whereas in the present investigation, the traditional knowledge of fishermen about overall behavior of commonly occurring 12 fish species and weed fish group in the rivers and reservoirs help them to catch a particular fish species by applying a specific fishing net as explained earlier and to choose a particular fishing time either day or night or the other specified under the explanations of each fish species in earlier descriptions. This traditional knowledge of fishermen on fish behavior may also be implemented in training the fishermen to catch a specific

fish species of commercial importance as a sustainable use of natural resource (Pandey, 2003). The data from this investigation will be quite useful to design a particular fishing gear/net to catch a particular fish species of commercial or medicinal value. Always the traditional knowledge of the communities involved in the utilization of natural resources has remained as a valuable data for planning the sustainable use of natural resources therefore this study will be useful in improving the fish yield, saving the fishing time, in maintaining the catch specificity and to think upon the monoculture of wild fish species of high market demand.

Acknowledgements

The authors are thankful to all the fishermen living in the Godavari river basin those who share their traditional knowledge on feeding behavior of fishes in the region through the sharing of their experiences and permission, consent for documenting the information. Thanks to UGC- New Delhi for financial assistance, the study was conducted as an additional part as research under the UGC- New Delhi funded Major Research Project (F. No. 41-65/SR (2012) dated: 11/07/2012).

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