Abundance of natural fish seed resources prioritized for mariculture in the

Jayasree Loka, K. K. Philipose, Smruta Phal, K. Navanath, S. M. Sonali, N. G. Vaidya
Karwar Research Centre of ICAR-Central Marine Fisheries Research Institute
Email: lokasree@gmail.com

Mariculture is a promising fish producing industry in India with cage farming of marine finfish and shellfish becoming popular along the entire coast. Fish seed availability is the need of the hour for sustaining and supporting expansion of cage farming of fishes in India. Capture Based Aquaculture (CBA), can be considered as an economic activity for fishermen communities to practise where by accessing natural fish seed resources for culture, it enhances the fish production, yield and market value. To undertake CBA as one of the mariculture activity in India, it is necessary to understand the availability of commercially important fish seed resources of Indian coast. Hence, a study was

undertaken along Kali estuary in Karnataka to understand the availability and abundance of fish seed resources, which are prioritized for mariculture in India.

Kali river has its origin near the village of Kushavali of Joida Taluka and drains into the Karwar Bay (14º 50' 21" N and 74º 10' 05" E) with a total water spread area of 4850 sq.km. The total low lying area in the lower reaches of the river is about 1217 acres. The deepest part of the estuary is found be at about 18 km upstream near Halga, where the depth on an average is 15 metres. Estuaries are dynamic in nature with a wide range of salinities. Moderate saline waters prevail in pre-monsoon (February-May), almost freshwater during monsoon (June-September) and high saline waters occur in post-monsoon (October-January) season. The pre-monsoon season is identified by high temperature and salinity conditions, the monsoon season by heavy rainfall with greater riverine discharge and land run off and the post-monsoon season for stable environmental conditions with a high biological productivity rate. The Kali River is considered as unpolluted because of lack of any industries on its banks and is a lifeline for both agriculturists and fish farmers from a very long time. Some areas of Kali estuary are known for exclusively rich bivalve resources and its brackishwater finfish resources.

Material and Methods

Seven stations were selected for the present study including Sunkeri, Kadwad, Nandangadda, Siddar, Kinner, Halga and Songeri (Fig.1).

Fish seed samples were collected using cast nets (5 m length, 17 m circumference and 11 mm mesh size) during the lowest low tide at weekly intervals in all the seven stations of Kali estuary for a period of one year (February 2016 to January 2017). 10 hauls were made in each station for each sampling and the net covered area was 4 m per haul. Finfish and shellfish seeds were identified up to species level following FAO species identification sheets.

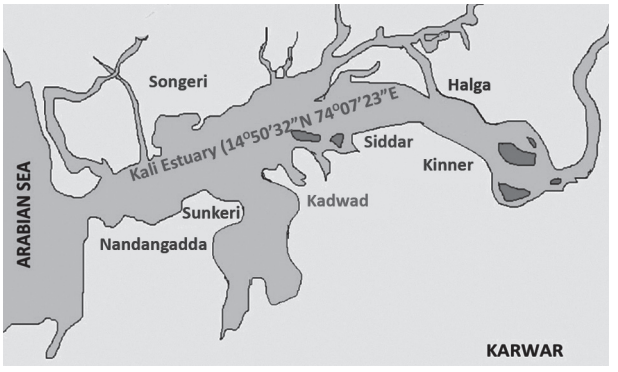

Fig. 1. Stations for collection of natural fish seed resources

Water quality parameters such as temperature, salinity, pH and dissolved oxygen were monitored at weekly intervals.

Results

In the present study 9 species were recorded out of 24 species prioritized for mariculture by ICAR-CMFRI, in Kali estuary (Table 1). These were *Caranx ignobilis, Mugil cephalus, Lutjanus argentimaculatus, L. johnii, Sillago sihama, Siganus javus, Lethrinus lentjan, Gnathanodon speciosus* and *Psettodes erumei*. *Caranx ignobilis* (35.6%) was found to be the most dominant species followed by *M.cephalus* and *L.argentimaculatus*. A significant variation ($p<0.05$) was observed in species occurrence and abundance among different stations and seasons.

C.ignobilis was the most dominant species in all the stations with a maximum abundance of 23.4% at Songeri followed by Sunkeri with 19.7% of abundance. Minimum was recorded in Nandangadda with 6.9%. *M.cephalus* was dominant in Sunkeri with a maximum abundance of 30.2 % followed by Kadwad (22.9%). The seed of *M.cephalus* was not recorded in Halga during the present study. *L.argentimaculatus* and *L.johnii* were recorded in all the stations except Nandangadda with a maximum abundance of 25.65% at Halga and Songeri (33.34%) respectively. *Sillago sihama* was recorded in three stations viz., Sunkeri, Kadwad and Nandangadda with 38.1% of abundance at Kadwad.

Table 1. Availability of prioritised natural seed resources along the Kali estuary

Prioritized species	Nandangadda	Sunkeri	Kadwad	Kinner	Siddar	Songeri	Halga
Lutjanus argentimaculatus	x	√	√	√	√	√	√
Lutjanus johnii	X	√	√	√	√	√	√
Caranx ignobilis	√	√	√	v	√	√	√
Gnathanodon speciosus	X	√	√	X	X	X	X
Mugil cephalus	√	√	√	√	√	√	X
Lethrinus lentjan	X	v	√	X	X	X	√
Psettodes erumei	√	√	X	√	√	√	X
Sillago sihama	√	√	√	X	X	X	X
S. javus	X	√	√	X	X	X	X

P.erumei was recorded in all the stations except Kadwad and Halga. Whereas, *G. speciosus* and *S.javus* were recorded in only two stations viz., Sunkeri and Kadwad *L.lentjan* was recorded in three stations (Sunkeri, Kinner and Halga).

Seasonal variations indicated that out of nine species recorded during the present study, five species such as *Caranx ignobilis, M.cephalus, L.argentimaculatus, L. johnii* and *S.sihama* were recorded in all the three seasons. Seeds of *C. ignobilis, M.cephalus* and *L.argentimaculatus* were found more abundant during monsoon season whereas, *L.johnii* was found more abundant during post monsoon and *S.sihama* during premonsoon seasons. *S.javus* is more abundant in pre-monsoon and completely absent throughout the monsoon season. *G. speciosus* was recorded only during the pre-monsoon season. *L.lentjan* is completely absent in pre-monsoon but recorded during the other two seasons. *P.erumei* was recorded during monsoon only.

Water quality parameters of Kali estuary indicated water temperature varied between 28°C -32.3°C, whereas, salinity, pH and dissolved oxygen were 3-21 ppt, 7.8-8.4 and 4.0 to 5.0 mg/l respectively.

The study indicated that *Caranx ignobilis* is the most predominant species of Kali estuary. It was also recorded that the four species namely *C.ignobilis, M.cephalus, L.argentimaculatus and L.johnii* were recorded in all the three seasons (Table 2).

Table 2. Seasonal variation in abundance of natural seed resources

Species	Pre monsoon	Monsoon	Post monsoon
C.ignobilis	35.4	35.6	29.5
M. cephalus	16.6	19.06	18.4
L.argentimaculatus	2.1	18.64	16.84
L.johnii	4.2	12.7	18.42
G.speciosus	10.4	0	0
L.lentjan	0	5.1	4.7
S.javus	10.4	0	3.2
S.sihama	20.8	2.11	8.94
P.erumei	0	6.8	0

Based on the availability and abundance of prioritized fish species at different stations of Kali estuary, potential sites for different fish seed were identified. Songeri was identified as the most potential site for seeds of *C.ignobilis*. Sunkeri is the most potential site for seed collection of *M.cephalus*. Potential sites for *L.argentimaculatus* and *L.johnii* were Halga and Songeri respectively. It is concluded that Kali is one of the most potential estuary for natural seed resources of fish species prioritized for mariculture.