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## Effect of environmental parameters on estuarine lobster and crab fishery and its management in thane estuary, Maharashtra

**Suraj Kumar Pradhan, S Abuthagir Ibrahlim, AD Nakhawa and Latha Shenoy**

### Abstract

Lobsters are benthic organism with high consumer demand, so it fetches high values in domestic as well as export market due to its delicious meat quality. There are 18 species belonging to 10 genera are under Palinuridae family in India. In India crab fishery is small scale and depends mainly on the capture fishery. There were more than 600 species of crabs reported from the Indian waters. Estuarine ecosystem is highly productive and it supports early life stages of many species. In Thane estuary, among lobsters, *Panulirus polyphagous* (Mud spiny lobster) and *Panulirus ornatus* (Ornate spiny lobster) and among crabs, *Portunus pelagicus* (Blue crab) and *Portunus sanguinolentus* (Three spot swimming crabs) comprised the major catch. These species targeted by using the specifically designed bottom set gill net and it supports the livelihood of traditional fishermen. The salinity along with the temperature plays an important role for the seasonality of the lobster and crab fishery in the estuarine area.

**Keywords:** Lobster, crab, estuary, set gill net

### Introduction

Lobsters are important export commodity either in live or in frozen form (Nanda kumar, G & Marry K. Manisseri, 2006 and Kleisner *et al.*, 2013) [7, 6]. Lobsters fetches high price in the market for its high demand in national and international markets. Total 18 species of rock lobsters representing to 9 genera in family *Palinuridae* have been reported from Indian Ocean (CMFRI Annual Report, 2017-18) [2]. In Maharashtra the lobster catch accounts 587 T contributing 0.96% to the total crustacean catch of the state. The most common gear operated to catch the lobsters are Trawls, gillnets, dolnets which contribute 65.28%, 34.59% and 0.14% respectively. Over the years the lobster catch landing increases significantly in the state due to its high demand and delicacy taste. Crabs are also belonging to the group of crustaceans and true crabs belong to Brachyura there are about 600 crab species found in Indian waters. In India the crab fishery mostly practiced as the small scale capture fishery in inshore and estuarine waters.

Estuaries are the transitional zones of terrestrial and aquatic ecosystem along the coastal region. An estuary is a semi-enclosed coastal body of water which has a free connection with the open sea and within which sea water is measurably diluted with freshwater derived from land drainage (Cameron and Pritchard, 1963) [1]. The pressure on the coastal natural systems leads to the increase in the pressure in the estuary as well. Many finfish and shellfish species depends on the estuary for their feeding and breeding ground in their entire or some part of the life. In Thane estuary, the gill nets operated are categorized into two categories, drift gill net and bottom set gill net, and the lobsters and crabs are mostly caught by the set gill net operated by the fishermen to get more profit in a short period of time.

The present study was carried out to find out the base reason of occurrence of lobsters only for a period of five months in the estuarine water of Thane. So the study provides an insight to the temporal distribution of lobsters and crabs in the estuary with respect to the changes in environmental parameters.

### Materials and Methods

The Thane district is bound by Nashik district to the north-east, Pune and Ahmadnagar districts to the east and Palghar district to the north.

The Arabian Sea forms the western boundary, while it is bound by Mumbai City District and Mumbai Suburban District to the southwest and Raigad District to the south. The

Thane estuarine area lies between 19° 18' 02" N to 19° 21' 23" N, 72° 34' 55" E to 72° 53' 16" E. Geographical location of study area is given in fig.1.

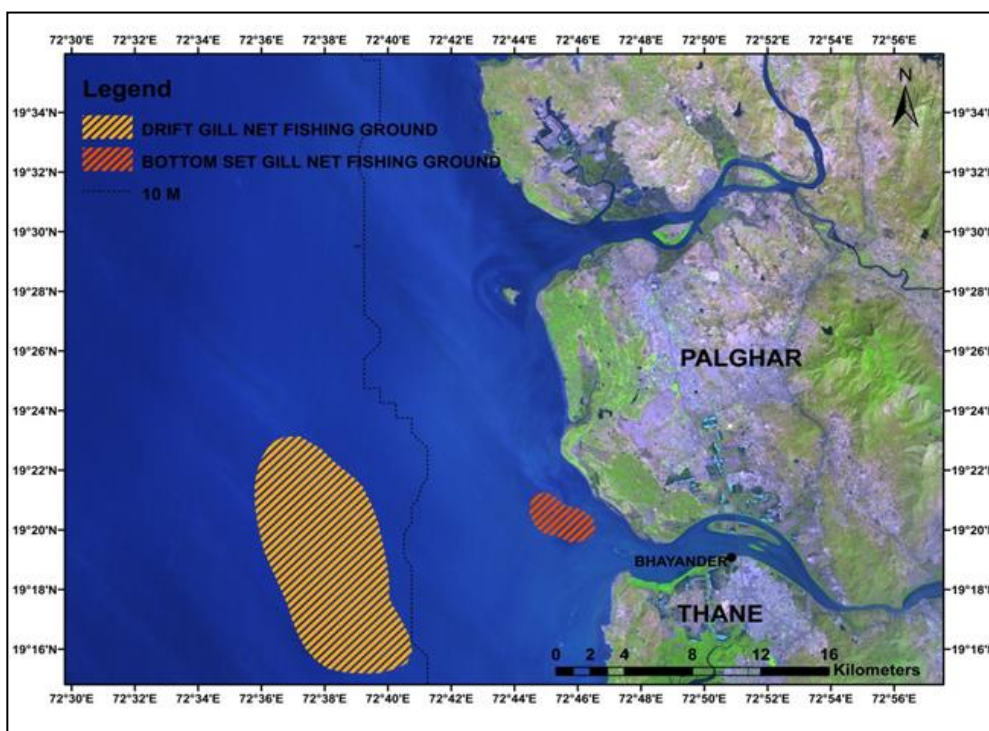


Fig 1: Study area- Drift gill net and bottom set gill net fishing ground

The time scale of study was from January 2017 to May 2017. These species were identified as per (Fischer and Bianchi, 1984) [3] and (Sparre et al. 1989) [11] and unsegregated catch of single-day operation from Thane estuarine area observed on board the fishing vessel in each month. The sea surface temperature (SST) and salinity profile of the estuary was collected for a period of complete one year except the ban season from the Copernicus web platform and then the data retrieved and synthesized in by using Sea DAS software.

**Results and Discussion**

The bottom set gill net is used seasonally from January to winter season for targeting the lobsters and crabs. The catch

mostly comprised of *Panulirus polyphagous* (Mud spiny lobster), *Panulirus ornatus* (Ornate spiny lobster), *Portunus pelagicus* (Blue crab), *Portunus sanguinolentus* (Three spot swimming crab and other fin fishes in little quantity. The salinity of the estuarine area shown that it was almost stable for a period of five months from January to May with 35 ppt to 37 ppt which is the most conducive and favourable salinity range for the lobsters and in other months of the year the salinity drastically reduced due to the heavy discharge of rivers Ulhas during post monsoon period. The SST during this period was 25 °C to 31 °C which was the easy tolerable range for the lobsters (Fig. 2).

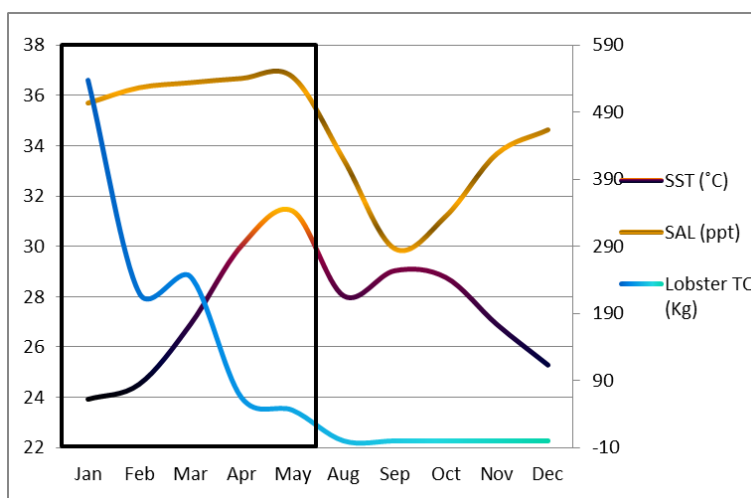
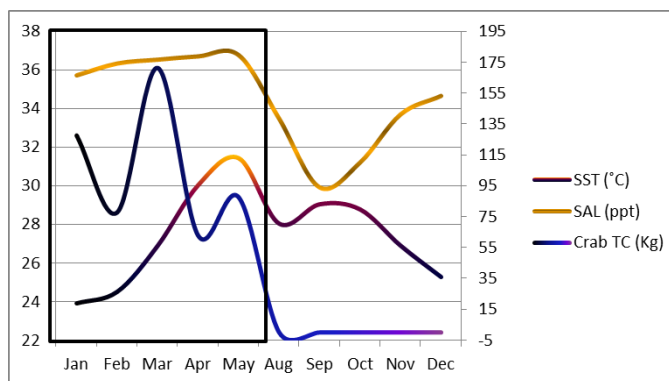
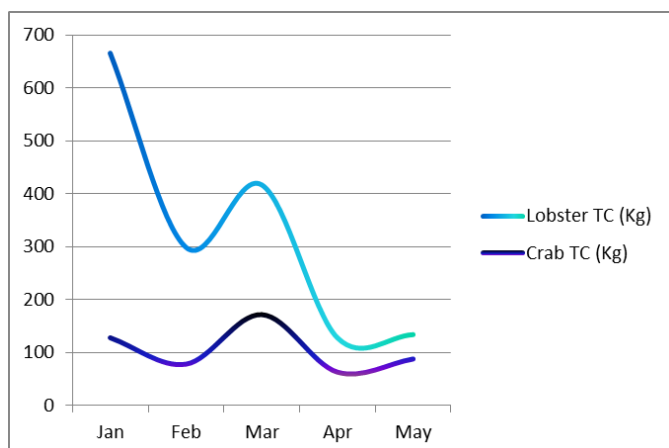


Fig 2: Effect of SST and salinity on lobster catch



**Fig 3:** Effect of SST and salinity on crab catch

The similar observation was reported for the tropical Palin rid species which can tolerate the temperature fluctuation of 23-29 °C and optimum growth at 30-38 ppt and the influence of salinity acclimation and temperature on the metabolic rate is evident (Kasim, 1986) [5]. Low salinity and migration behaviour for breeding are the major factors for the seasonal gill net fishery. In the other months the sub adult lobster migrates towards the sea for their growth and development where after maturation they are most vulnerable to the trawl fishing and this is the reason for the occurrence of berried females in the trawl net. The total catch of lobster and crab directly related, because crab is the by catch in the targeted lobster fishery (Fig. 4). Though the volume of lobster is less, but it fetches high price due to high market demand.



**Fig 4:** Lobster and crab catch trend in the estuary

### Conclusion

Major catch in lobster gill net consisted of lobsters, crabs; croakers etc. and fishermen were getting good earning. There is no information on the settlement density of Puerulli anywhere along the Indian coast. (Radha krishnan, 2012) [12]. The present study revealed the non-availability of lobster during the off season is due to the drastic reduction in the salinity, and in order to avoid the stress they migrate to offshore waters, where they subjected to caught by trawlers (mostly berried). The information on catch composition and effect of environmental parameters on the lobster fishery will help the resource managers to suggest and manage for the sustainable exploitation and utilization.

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