



Artisanal Fisheries Landings During Pre-Monsoon Season From Thane Creek And Anthropogenic Disturbances.

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Abstract

Although a total of 30 fish species was recorded in the lower zone of Thane Creek, there was an abrupt drop in fish species diversity in the middle with 8 species and upper zones with 2 species. The plastic pollution, and narrowing of the creek channel due to civil development and reclamation like bridges, pipelines, and landfilling. Thane Creek was blocked at the mouth due to the 'Mankhurd-Vashi Bridge' that reduced the width of the channel by 50.43 percent. This led to hinder the tidal current force disabling to flush out the solid waste from the creek. Furthermore, the shallowing effect due to siltation and diminished tidal water current which ultimately allowing to settle more solid wastes at the bottom along with plastic were the other reasons for the further decline in fish diversity and catches. Nevertheless, plastic also troubled fishing activities due to the net-clogging effect in the middle and upper zones. Nper0 percent of plastic was hauled in fishing attempts yielding very meagre fish catches per unit effort.

Key Words

Artisanal Fisheries, fish diversity, Thane creek, anthropogenic activities.

Introduction:

Artisanal is the protein supply of the local population. Some fish species are either highly relished in the locality for their taste or as part of their tradition while others are the staple food. Hence the artisanal fisheries play important role as they support economy of the fishermen community dependent on them. Fishes are the indicative of the health of the water bodies where they exist. Sehara et al. (1992) reported that only 42 % of the fishing population practiced fishing while Rathod (2012), reported that majority of the

fishermen have abandoned the fishing practices due to non-productive status of the Ulhas river estuary fin-fisheries during 2006. Pagdhare and Bhakay (2012) recorded active fishermen constituted 27% of the marine fisher folk population out of which 73% were occasional in the Thane district from Maharashtra.

The inward waters of marine environment like estuaries and creeks are the ideal habitats for the artisanal fisheries and have been explored by several experts world over. Nevertheless, in recent years with the advent of urbanization, agriculture and industrial developments the coastal marine environment has been highly deteriorated. The estuaries and creeks are not exceptions. The inward waters are the approachable outlets for domestic wastes, industrial effluents, plastic disposal, agricultural sheet flow and solid waste dumping. Owing to clogging of gears due to plastic carry bags during their operation the catches were reduced from TZ-I, the fishing had almost halted. Apart from these various civil developments like crossing pipelines, road and railway bridges, narrowing of channels through reclamation activities, mangrove annihilation, beautification, eco-tourism, sand excavation etc. put heavy pressure on these water bodies.

The Thane Creek near Thane City of Mumbai coast is highly affected due to various anthropogenic activities in their vicinity. In recent years it has been reported that the fisheries from Thane Creek have declined to very alarming status (Qaudros, 2012; Rathod, 2017). It is of very pertinent to monitor the fisheries regularly to understand their further fate. The earlier studies reported that the upper regions of the Thane Creek has declined to non-economic level and have abandoned from fishing due to plastic pollution (Rathod, 2016). The fishing mostly occur in the oceanic part (towards the mouth of the creek) of the creek. In this report, an analysis of the status of artisanal fisheries from Thane creek with respect to the plastic pollution was planned.

Material and Method

The Thane Creek initiates at Latitude 19° 13'N and Longitude 73° 00'E towards the Arabian Sea and heads northwards for about 26 km to join the URE at Balkum towards N-W between latitude 19° 03'N and longitude 72° 58' E at Vashi-Mankhurd bridge on world map measuring 18.7 km. The creek further flows for 31.2 km before it joins the Arabian Sea towards west. A considerably broad creek at oceanic south end narrows down abruptly at its north end towards upper zone due to high reclamation activities. This renders characteristic physicochemical features that change according to the length drastically. In addition, the constricted opening at Vashi due to the bridge affects the flow of tidal oscillations. There are dense residential areas lying on either banks of the Thane Creek.



Figure 1 Thane Creek: TU = Upper zone; TM = Middle zone; TL = Lower zone and TO = Oceanic zone. The study carried at TL where constriction of the canal due to bridge hindered the tidal current thereby disabling creek to flush out the polluted water to ocean. TU is almost disconnected from the Ulhas River estuary (URE) as the channel became narrow and shallow due to the reclamation activities and solid waste dumping. TU also has four bridges and a pipeline crossing

The fishing activities were negligible in the upper zones of Thane Creek due to high pollution especially plastic load. Therefore, in present study the fisheries landings were recorded in pre-monsoon season from April to June 2015 from lower zone at Vashi jetty of the Thane Creek. Observations were made for fishing activities, fish landings, and analysis of fish diversity.

Fishes were observed and identified on site of landing centres on monthly basis. Unidentified specimens were collected for identification later. Specimens were collected in an ice-box and carried to laboratory. Pooled data of qualitative fish composition was estimated.

The fishing activities declined with fisheries catches due to various anthropogenic activities such as channel alteration and plastic pollution observed in the pre-monsoon season in Thane Creek. The observation of channel narrowing, channel blockage, plastic clogging of the net, plastic hauling along with the catches etc. was identified as important causes for the decline in fisheries were observed on the fishing grounds and landing stations.

Result and Discussion:

i. Fishing activities

Fishing occurs from August to June of the year. The highest fishing activities were observed in pre-monsoon season from March to June, preferably in high tides. Fishing attempts were made according to lunar cycle i.e. fishing community from Thane-Mumbai coast follow lunar cycle periodically for fishing activities between full moon day and new moon day. Fishing community avoid fishing from 4th to 5th day of the full moon and new moon days which they traditionally call as 'bhang' as catch is insignificant during these days. Some may go for fishing from 5th day ('Panchami') onwards until 10th day ('Dashami') known as 'udhan' during which the fish catches increase by mass/day. A period from 11th to 15th day is considered as best for fishing since most fishery species appear only in this period in estuaries and creeks. Similar trend was observed by various experts world over (Desai, 1974; Ortega-Garcia, *et al.*, 2008; Libini and Khan, 2012; Sajeevan and Sanadi, 2014; Das *et al.*, 2015). Fishing was performed using only drifting gill nets locally known as 'disco-jali'. The dimension was 30 to 50 m in length and 2 m in height with mesh sizes ranging from 100 mm to 20 mm. Earlier, there were two types of gill nets used in TC viz. 'busa' a surface gill net and 'pera' bottom gill net. In present study, only 'busa' was operated due to non-availability of fish at bottom (Rathod, 2016). The gear is tied at the stern of the mechanized boat and towed against the tidal current. The net is hauled when it becomes heavy enough to hold the load and fish are collected in the anterior part of the boat. The process is repeated until the fishing is halted on a day. Fishing is stopped at full tide and fishing boats return to jetty with the onset of low tide.

The fishing attempts¹ on an average were only 3 in the upper zone (TU) of Thane Creek; in middle zone (TM), 14 and in lower zone (TL) 42 attempts of fishing per unit day were recorded during the pre-monsoon season.

ii. Fish Species Diversity

With higher catches at TL corroborated with high species diversity. The species diversity reduced sharply towards the upper stretch (TM and TU) of the Thane Creek (Table 1). Total 30 fish species were recorded at TL; 08 at TM and 02 TU. The anthropogenic activities like domestic sewage, solid waste disposal, channel narrowing due to reclamation, bridges and pipelines constructions on the channel, certain ritual activities, plastic pollution, storm water, PAH, etc. (Rathod, 2016). Qaudros and Athalye (2012) reported only 12 species of fish from TC out of which 5 species were observed in entire stretch viz. *Mugil cephalus*, *Mystus gulio*, *Arius arius*, *Oreochromis mossambicus* and *Scylla serrata*. In present study, only *Mystus gulio* and *Oreochromis mossambicus* recorded in TU while all five species caught in TM along with *Megalops cyprinoides*, *Boleophthalmus dussumieri* and *Penaeus indicus*. But the catches were low and sporadic.

¹ The fishing attempts were recorded through the boats arriving at the landing centres and the interview of the fishers.

Table 1 Fish Species Scores During Pre-monsoon Season in TC

Sr. No.	Family	Scientific Name	Common / Local Name (marathi)	Occurrence (Score)	Category
1.	Mugilidae	<i>Mugil cephalus</i>	Mullet/ Boi	+++++	Inhabitant
2.	Mugilidae	<i>Valamugil speigler</i>	Mullet/ Boir	++	Inhabitant
3.	Bagridae	<i>Mystus gulio</i>	Long whisker catfish/ Chimni	++++	Inhabitant
4.	Megalopidae	<i>Megalops cyrpinoides</i>	Indo-Pacific Tarpon/ Varas	++	Inhabitant
5.	Oxudercidae	<i>Boleophthalmus dussumieri</i>	Dussumier's mudskipper/ Nivti	+++	Inhabitant
6.	Oxudercidae	<i>Boleophthalmus boddarti</i>	Boddart's goggle-eyed goby/ Chitti	+	Inhabitant
7.	Oxudercidae	<i>Trypauchen vagina</i>	Burrowing goby/ Kaleti	+	Inhabitant
8.	Portunidae	<i>Scylla serrata</i>	Mud crab/ Chimbori	+++	Inhabitant
9.	Cichlidae	<i>Oreochromis mossambicus</i>	Tilapia/ Kala masa	++	Inhabitant
10.	Latidae	<i>Lates calcarifer</i>	Baramundi/ Jitadi	+	M Visitor
11.	Teraponidae	<i>Terapon jarbua</i>	Jarbua Terapon/ Naveri	++	M Visitor
12.	Teraponidae	<i>Terapon theraps</i>	Large scaled Terapon/ Naveri	++	M Visitor
13.	Scatophagidae	<i>Scatophagus argus</i>	Spotted scat/ Wada	++	M Visitor
14.	Sciaenidae	<i>Johnius dussumieri</i>	Sin croaker/ Dhomi	++++	M Visitor
15.	Clupaidae	<i>Anodontostoma chacunda</i>	Chacunda gizzard shad/ Niv	+++	M Visitor
16.	Gerreidae	<i>Gerres erythrourus</i>	Deep-bodied mojarra/ Charbat	+	M Visitor
17.	Ophichthidae	<i>Pisodonophis boro</i>	Rice-paddy or Bengal's snake eel/	++++	M Visitor
18.	Penaeidae	<i>Penaeus monodon</i>	Tiger prawn/ Kolbi	+	M Visitor
19.	Penaeidae	<i>Penaeus indicus</i>	Indian white prawn/ Safed zinga	+++	M Visitor
20.	Penaeidae	<i>Metapenaeus monoceros</i>	Speckled shrimp/ Kapsi	+	M Visitor
21.	Penaeidae	<i>Parapenaeopsis stylifera</i>	Kiddi shrimp/ Karkari	+	M Visitor
22.	Penaeidae	<i>Metapenaeus bervicornis</i>	Yellow shrimp/ medium Kolbi	+	M Visitor
23.	Palaemonidae	<i>Palaemon stylifera</i>	Roshna prawn/ Kadandi	+	M Visitor
24.	Sergestidae	<i>Acetus indicus</i>	Paste shrimp/Jawala	+++	M Visitor
25.	Portunidae	<i>Portunus sp.</i>	Swimming crab/ Ghodi	+	M Visitor
26.	Grapsidae	<i>Goniopsis sp</i>	Purple mangrove crab/	+	Bycatch
27.	Varunidae	<i>Austrohelice crassa</i>	Tunneling mud-crab/ khekda	+	Bycatch
28.	Ocypodidae	<i>Austruca (Uca) annulipes</i>	Fiddler crab/	+	Bycatch
29.	Squillidae	<i>Oratosquilla nepa</i>	Mantis shrimp/ Hijada	++	Bycatch
30.	Hydrophiidae	<i>Enhydrina schistosa</i>	Beaked sea snake/	++	Bycatch

The high potential yield is evident from TC as the high fish diversity was observed at TL during pre-monsoon. However, the low diversity at TM and TU indicated that the fishes are unable to rise due to certain reason.

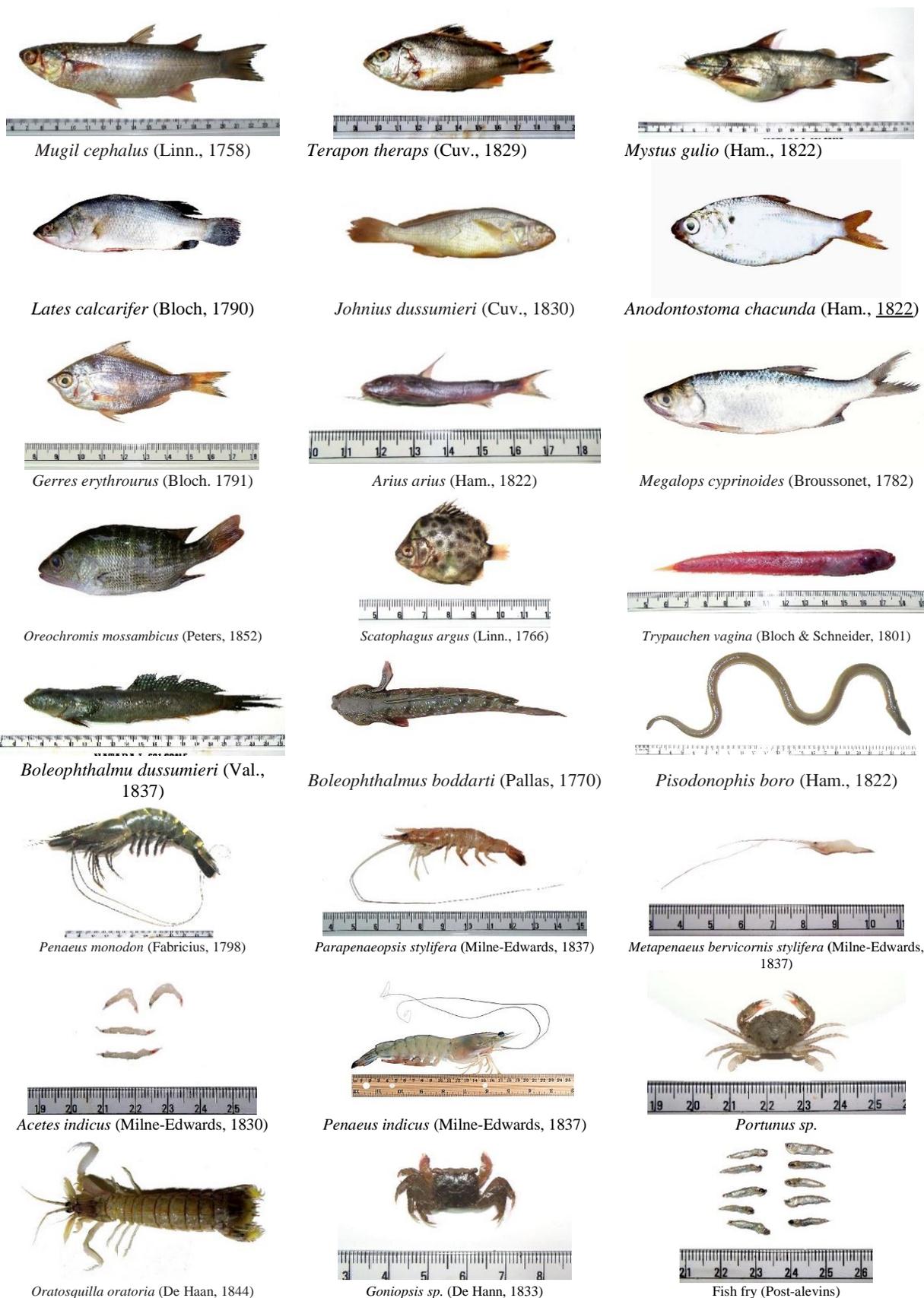


Figure 2. Some frequently caught fish species from TC during the study

iii. Fish landings

The fish landings, in biomass, were very meager as compared to earlier records (Rathod 2020). The higher fish landings at TL discerned the high potential fishery but it was not true for TU and TM of the creek. The high residential density and urban activities in TU and TM might be the reason for the low fish catches. Earlier reports revealed the deterioration in upper zones (TU and TM) due to various anthropogenic activities (Singare, 2012; Quadros and Athaye, 2012; Rathod, 2020).



Figure 3. Glimpses of meager fish catches from TC during the study

iv. Anthropogenic Interruptions:

Various anthropogenic activities like narrowing of the creek channel due to reclamation and civil developments and blockage of channel; and plastic pollution found to be main causes for directly affecting the fish catches in present study.

a. Channel Modification:

The bridge constructions and pipelines construction were changing the channel property and involved in hindering the tidal current velocity. The upper end of the channel towards Balkum-Kasheli was clogged due to high siltation (Fig. 4, a, b & c). The reclamation activities like construction of slums and housings were overwhelming in the upper region (TU). There were six bridges and three pipelines on the TU region (Fig. 4, e). In 'TM' one bridge and in 'TL' one bridge. The bridge in 'TL' known as 'Mankhurd-Vashi Bridge' and it is another major cause for hindrance of the tidal current. The maximum width of the creek in 'TL' near Sector 10, Vashi was 2982.34 M., which narrowed down to 1504.07 M. Mankhurd-Vashi Bridge (along the sector 31), mouth of the TC to about 50.43 percent (Fig. 4, f). Nevertheless, the reclamation activities occurred on either banks of the TC in TU and TM.



Figure 4. Anthropogenic Disturbance at TU region of Thane Creek

b. Plastic Pollution:

Plastic is the major factor affecting the fish catches in TC. Rathod (2020) recorded numerous sources of plastic through various human activities (Fig. 4, d). Singare (2012) reported high amount of non-biodegradable solid waste dumping in TC. Gokhale and Athalye (1995) have revealed that fishing has virtually stopped in upper reaches due to clogging of their nets with plastic carry bags.

The TC at TU, at Kasheli Bridge where it meets Ulhas River Estuary, was blocked due to shallowing of channel. The earlier study reported that the water influx from Ulhas River Estuary carried fish to TU and enhanced the water flow downstream, which probably was helpful to flush the TC. This maintained high catches in TU (Tandel, 1984; Pejaver, 1987). In present conditions, there were no such mechanism to get rid of the plastic loaded water to flush out of the channel and hence it remained oscillating with the tidal current within the creek itself.

Plastic pollution due to disposal and storm waters during pre-monsoon were causing trouble in fishing activities and fish catches. The gill nets were loaded with very high mass of plastic measuring about 80 to 90 percent of the total mass of the catches. It took high effort to separate the plastic from the landings to discover meager fish catches with every attempts (Fig. 5).



Figure 5. Plastic menace in fishing activities observed along the TC during the study

Conclusion:

The high diversity of TL indicates the potential of fisheries of TC. However, the TU and TM exhibited very low fisheries. This might be due to the plastic pollution as one of the major causes to hinder the entry of fish in the creek. Abrupt fall in fish diversity and ladings indicates that the narrowing and shallowing effect of TC might be the main cause for the physico-chemical deterioration of the water body. The construction of Mankhurd-Vashi Bridge has narrowed the mouth of the creek which hindered the tidal current flow. This diminished the flushing force of tidal water, consequently disabling it to clean the channel. The weakened tidal current is unable to carry solid waste, especially plastic to ocean. The plastic, therefore, settled to the bottom affecting the shell-fish and mudskipper fisheries. The plastic, in captivity, which keeps oscillating with the tidal water current up and down within the creek channel, hindered the entry of fin-fish species and thus causing acute drop in fish catches in upper zones of the TC. Moreover, the narrowing of channel due to reclamation activities and shallowing of channel due to siltation have probably the other reasons of decline in fish catches in upper zones.

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