

DETERIORATION OF THANE CREEK ECOSYSTEM NEAR THANE CITY OVER THE PAST 20 YEARS

Thane creek (long. 72° 55' to 73° 02' E and lat. 19° 00' to 19° 15'N) lies on the west coast of India. It begins from the Bombay harbour and extends 26 km northwards joining the Ulhas river by a minor connection near Thane city. The creek has more influence of tidal marine water as compared to freshwater and is fringed with mangroves (mainly *Avicennia marina*) along both its banks. The Thane-Belapur industrial complex and Navi-Mumbai residential complex are on the east bank of the creek while the west bank has densely populated Thane-Mumbai residential area and a good number of industries as well. These industrial and urban complexes release their effluents and waste in to the creek causing stress and deterioration of the ecosystem (Govindan *et al.*, 1976; Desai *et al.*, 1977; Zingde *et al.*, 1979; Varshney *et al.*, 1984; Mohapatra, 1985; Neelam Ramaiah *et al.*, 1998 and Krishnamurthy and Nair, 1999).

Regular monitoring of the hydrological parameters is of help in finding out the deterioration in water quality and in evolving the mitigation strategy. This article presents the results of the four annual survey undertaken over the years 1981 - 2000.

The study was conducted in the shallow and narrow 7 km stretch of Thane creek near Thane city. The study periods were May 1981 - April 1982; May 1988 - April 1989; May 1992 - April 1993 and May 1999 - April 2000. The water samples were collected weekly during high tide and low tide from 5 different locations using clean plastic buckets and the water quality parameters were estimated using standard methodology (APHA, 1981).

The results indicated prolonged hypoxia (range 1.06 - 2.79 mg/l; av. 1.76 mg/l) as the dissolved oxygen was mostly below 2.5 mg/l (Laponite and Clark, 1992). The hypoxic DO was coupled with high suspended solids (range 1.325 - 18.025 gm/l; av. 7.073 gm/l), which were much

higher compared to most of the Indian estuaries (Goldin Quadros, 1995). The salinity (range 0.59 - 32.71 psu.; av. 16.6 psu.) showed seasonal variations; low salinity during monsoon and high during non-monsoon months. The average annual salinity was mesohaline (< 18 ppt.), however it did not help in increasing the dissolved oxygen content, indicating the level of anthropogenic activities.

A comparison of the data collected from 1981 to 2000 showed gradual decrease in oxygen level (5.3 mg/l - 1.6 mg/l). The saturation level which was 82% during 1981 - 82 decreased to 70%, 33% and 25% respectively during the years 1988 - 89, 1992 - 93 and 1999 - 2000. The minimum dissolved oxygen recorded in 1981-82 was 3.63 mg/l, by 1988-89 10 % of the total readings were below the hypoxic limit of 2.5 mg/l, whereas in 1992-93 the frequency of hypoxia increased to 70 % and became 84 % in 1999-2000.

In Thane creek the average salinity over the years has decreased from polyhaline (i.e. > 18 ppt.) to mesohaline (i.e. < 18 ppt.). Logically the dissolved oxygen should have improved, but on the contrary it showed decline indicating the influence of pollutants.

The detrital particles generally formed a major component of suspended matter in the sewage polluted aquatic environments (Goldin Quadros, 1995). The suspended solids in Thane creek increased by 315 % in 1999-2000 compared to those in 1981-82.

The reasons for the deterioration include the decadal rise in population (TMC-ESR, 2000) of Thane from 4,74,170 in 1981 to 7,96,000 in 1991 to the present 14,50,000. This has increased the quantity of solid waste and effluents released into the creek without any treatment. This is because Thane Municipal Corporation has a primary sewage treatment plant of 56 mld. capacity as against the 220 mld.

effluents generated in the TMC area (TMC-ESR, 2000). The solid waste of about 750 tonnes/day and 200 tonnes of industrial waste/day, are dumped along the banks of the creek. This solid waste dumping gradually has resulted in reclamation and encouraged construction activities like building of roads, bridges, residential complexes, etc. As a result of these activities, flow of tidal water has been affected, due to which flushing characteristic of the creek is hampered. This probably has led to increase in suspended solid load and hypoxia, ultimately affecting the health of the ecosystem.

The increased human pressure has significantly destroyed the mangroves of Thane city. In 1981-82 mangroves occupied an area of about 25 ha, which declined to 15 ha in 1992-93 and to 9 ha in 1999-2000. The decimation of mangroves coupled with perpetual hypoxia has led to the destruction of breeding and feeding grounds of the fishes in this region. The data of monthly fish catch revealed 68% reduction in 1992-93 compared to 1981-82 (Gokhale and Athalye, 1995), whereas now (i.e. 1999-2000) fishing has become an occasional activity (barely 4% in comparison to 1981-82) due to non-profitable yields in Thane region. The locals had to either change their occupation or travel to lower stretches of the creek to continue with their profession.

To conclude, the long-term studies on Thane creek point out growing pollution in the creek. This has adversely affected the mangroves and fishery of the creek thereby the livelihood of local fishermen who depended on that.

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**Goldin Quadros*, R.P. Athalye,
Vidya Mishra, Vidya Ullal,
Mangal Mukherjee, Madhuri K. Pejaver,
S.S. Tandel, Mangal Borkar,
Vaishali Somani and K.S. Gokhale**
Zoology Department,
B.N. Bandodkar College of Science,
'Dnyanadweep' Chendani,
Thane 400 601, Maharashtra, India
*Email : goldinq@yahoo.com