IJARSCT

ISSN (Online) 2581-9429

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Impact Factor: 7.301

Volume 3, Issue 3, March 2023

Assessment of Water Quality Seasonally at Sheva Creek, West Coast of India

Aamod N. Thakkar

Veer Wajekar A.S.C. College, MahalanVibhag, Phunde,Tal. Uran Dist. Raigad

Abstract: *Sheva Creek, Thane Creek, the Jawaharlal Nehru Port Authority (JNPA), the Bharat Mumbai Container Terminal, and the Nhava Shewa International Container Terminal are all connected to the Arabian Sea. It gets a considerable volume of home and industrial garbage. Monitoring the condition of coastal waters on a regular basis is crucial for assessing marine water contamination. Seasonal assessments of water's physical and chemical characteristics were made during the current experiment. The current study shows seasonal fluctuations in water quality measures, and anthropogenic pressure currently has no discernible impact on them.*

Keywords: Shewa Creek, Container Terminal, Water Quality, West Coast.

I. INTRODUCTION

Like in the majority of developing nations, India's maritime states' coastal zones experience significant anthropogenic pressure (Zingde, 1999). The majority of oceanic nations regularly monitor the condition of their coastal waters because it is crucial to Most nations regularly monitor the physical and chemical characteristics of coastal waters in order to assess the quality of marine waters. An important factor in assessing and establishing the level of pollution and the health of the water is the study of coastal water quality.

Several researchers have evaluated the health of the water quality in and around Mumbai Harbor. Zingde and Sabnis reported on the varying water quality caused by wastewater discharge in the Mahim estuary and nearby near-shore waterways (1994). Swami et al. (2000) reported on the water quality state of Mumbai (Bombay) Harbour and the surrounding tidal basin as well as the concentration of micronutrients. An evaluation of the nutrient fluxes and interstitial water chemistry from tropical intertidal sediment of Gorai Creek, Mumbai Ram, and Zingde (2000). Quadros et al. (2001), Kulkarni and Taherizadeh (2002), Rathod Sudesh et. al. (2002), Athale R. P. et al. (2003), Raghukumar& Anil (2003), Varshney et al. (2006), Rathod and Patil (2009), Pawar, Prabhakar R. (2013). have documented the degradation of the Thane and Mumbai area's coastline water quality brought on by human activity.

Since CIDCO, a government authority, acquired property for urbanisation, industrialisation, and reclamation, the coastal belt of Uran has been under a great deal of stress. The coastal region of Uran has experienced rapid development and industry over the past few decades. On the shore of Uran is a significant port known as Jawaharlal Nehru Port Authority (J.N.P.A.). The J.N.P.T. hauling activities, domestic and industrial waste discharges, and land filling for Port associated use cause coastal water to become murky, greasy, and filthy. Anthropogenic degradation of the coastal waterways is occurring in Uran as a result of the country's high population density. The Uran shore, which is 20 kilometres from Mumbai, India's financial centre, is a significant fishing area. When it comes to supplies for fish and shellfish, the shore has a significant position. Beginning of Jawaharlal Nehru Port Trust (JNPT), the busiest international port and 28th-ranked port in the world, in 1989. (Handles 44 Lac containers in current year). In the coastal region of Uran, it was thought that the main environmental issues were oil, sewage, and industrial pollution. Container Freight Stations' frenetic activity along a section of Sheva Creek. Industrial effluents and transportation-related leaks/discharges contribute to numerous cases of coastal pollution. As a result, Sheva Creek's water quality is being monitored during the current study.

Study area and methodology: Sheva Creek is distinguished by vast mud flats with scarce mangrove vegetation and fewer stony parts (Lat. 180 50' 20" N and Long. 720 57' 5" E). The length of the creek is home to the Jawaharlal Nehru Port (JNPA), the Bharat Mumbai Container Terminal, the Nhava Shewa International Container Terminal, and other

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, March 2023

port-related businesses. The north bank of the creek is home to the well-known tourist destination Gharapuri Island (Elephanta caverns). Along with Thane Creek and Vashi Creek, the Sheva Creek joins the Arabian Sea.
Surface water samples from the chosen site were taken biweekly during the spring low and high tides seasonally in a clean, leak-proof plastic container during the current experiment (January 2022 to December 2022). We used the accepted techniques outlined by APHA (1999) to analyse the water quality.

II. RESULTS AND DISCUSSION

Sr. No	Parameter	Mean Values Pre monsoon June 2022	Mean Values Monsoon August 2022	Mean Values Post monsoon May 2022
1	PH	8.12-8.24	6.29-6.98	7.16- 7.83
2	Temperature	26.6-33.4 °C	27.6-29.7°C	23.04-27.42°C
3	Turbidity	37.7- 44 NTU	25.78-35.23 NTU	26.42- 32.66 NTU
4	TDS	41.8-44.81 mg/L	35.46- 38.84 mg/L	36.24-40.56 mg/L
5	TS	45.56-47.14 mg/L	48.36-52.16 mg/L	46.84- 58.88 mg/L
6	TSS	3.46-5.88 mg/L	4.64-7.18 mg/L	4.38-6.54 mg/L
7	DO	3.62-4.84 mg/L	4.32- 5.14 mg/L	4.02- 4.96 mg/L
8	BOD	1.96-3.54 mg/L	1.64-327 mg/L	1.48- 2.66 mg/L
9	COD	44.64-58.88 mg/L	38.04- 42.36 mg/L	39.16-46.96 mg/L
10	Ammonia NH3-N	0.36-0.64 µg/L	0.012-0.37 µg/L	0.26- 0.54 µg/L
11	Nitrate NO3-N	20.3-32.0 µg/L	28.04 –36.8 µg/L	32.86-47.54 µg/L
12	Nitrite NO2-N	1.74-2.56 µg/L	1.44- 4.32 µg/L	2.16-3.88 µg/L
19	Phosphate PO4	0.42-0.51 µg/L	0.48-0.62 µg/L	0.52-0.71µg/L
14	Silicate SiO4	35.56-47.58 µg/L	58.88- 66.42 µg/L	28.74- 44.86 µg/L
15	Salinity	30.20-36.86ppt	20.14-.25-33.86ppt	23.64- 26.86ppt

III. DISCUSSION

Results of water parameters from Shewa Creek during the year 2022-23 are as follows:
PH: In June 2022, an alkaline pH (8.12–8.24) was seen during pre-monsoon, however in August 2022, during monsoon, the pH was somewhat acidic (6.29–6.98). Following the monsoon, an alkaline pH was observed (7.16- 7.83). Weed photosynthesis contributed to a higher alkaline pH. (Subba Rao et al.,1981).
Temperature: Pre-monsoon high temperatures ranged from 27.8 to 34.4 °C in high tide water, while low tide water temperatures ranged from 25.46 to 30.86 °C. The temperature fluctuated between (27.6-29.7°C) during the monsoon and (23.04-27.42°C) during the post-monsoon. This temperature variance is bimodal, peaking in May and October and troughing in January and February (Pawar, and Kulkarni 2007).
Turbidity: High turbidity (39.8–46.4 NTU) in high tide water was observed during the pre-monsoon season, while low tide turbidity was (28.4-38.7 NTU). In the monsoon, turbidity was (25.78-35.23 NTU), but in the post-monsoon, it was

(26.42- 32.66 NTU). High turbidity was seen in the pre-monsoon due to extensive drains and sewage systems that were opening into the creek with enormous amounts of debris (Hossain et al., 1988).

Total dissolved solids TDS: In high tide waters, TDS values ranged from 31.6 to 39.4 mg/L, while TDS values in low tide waters ranged from 42.8 to 47.6 mg/L. TDS between the pre-monsoon period (41.8-44.81 mg/L), the monsoon period (35.46-38.84 mg/L), and the post-monsoon period (36.24- 40.56 mg/L).

Total solids TS: Total solids variations were similar as total dissolved solids in the creek and significant higher values were noted in low tide water. TS during pre- monsoon was (45.56-47.14 mg/L) during monsoon was (48.36-52.16 mg/L) and was higher during post monsoon (46.84- 58.88 mg/L) which is due to mixing of shallow bottom content to the above water by strong waves and tidal currents.

Total suspended solids TSS: TSS during pre- monsoon was (3.46-5.88 mg/L) was higher during monsoon (4.64-7.18 mg/L) and during post monsoon (4.38-6.54 mg/L). TSS was higher during post monsoon. TSS also observed higher during low tides as TS and TDS. The increased turbulence during monsoon and high particulate matter normally associated with the runoff results in substantial increase in the suspended matter (Zingde and Govindan, 1997).

Dissolved oxygen DO: DO during pre- monsoon was (3.62-4.84 mg/L) during monsoon was (4.32- 5.14 mg/L) and was higher during post monsoon (4.02- 4.96 mg/L) due to increase in photosynthetic activity associated with lower temperature (Valdes and Real,2004).Lower Do (3.12-4.34 mg/L) was noted in low tide water during pre- monsoon. Whereas higher Do values (4.64 – 6.72 ml/l) were observed during post monsoon high tide water this can be correlated to mixing of offshore water with high oxygen level to inshore water.

Biological oxygen demand BOD: BOD levels were higher during the low tide following a rainfall. Pre-monsoon values for BOD were (1.96-3.54 mg/L), monsoon values were (1.64-327 mg/L), and post-monsoon values were higher (1.48- 2.66 mg/L). Due to the oxidation of massive amounts of garbage, the pre-high monsoon's BOD value was caused by oxygen consumption (Campbell, 1978). Low BOD levels observed in the creek can be linked to the release of residential sewage there (Zingde and Sabnis, 1994).

Chemical oxygen demand COD: Pre-monsoon values of NH3-N were (0.36-0.64 g/L), monsoon values were (0.012-0.37 g/L), and post-monsoon values were higher (0.26- 0.54 g/L). Extremely low ammonia levels were recorded during the monsoon because all of the ammonia that had been released had been completely oxidised to nitrite and nitrate (Josanto and Sharma, 1985, Zingde and Sabnis, 1994).NH3-N concentrations ranged from 0.36 to 0.64 g/L before the monsoon, from 0.012 to 0.37 g/L during the monsoon, and from 0.26 to 0.54 g/L after the monsoon. Because all of the ammonia that had been released had been entirely oxidised to nitrite and nitrate, extremely low ammonia levels were observed during the monsoon (Josanto and Sharma, 1985, Zingde and Sabnis, 1994).

Ammonia NH3-N: Pre-monsoon values of NH3-N were (0.36-0.64 g/L), monsoon values were (0.012-0.37 g/L), and post-monsoon values were higher (0.26- 0.54 g/L). Extremely low ammonia levels were recorded during the monsoon because all of the ammonia that had been released had been completely oxidised to nitrite and nitrate (Josanto and Sharma, 1985, Zingde and Sabnis, 1994).

Nitrate NO3-N: Values for NO3-N Pre-monsoon levels were (20.3-32.0 g/L), monsoon levels were (28.04 -36.8 g/L), and post-monsoon levels were higher (32.86-47.54 g/L). In comparison to low tide, values during high tide were lower. Shewa Creek's higher Nitraes readings are consistent with Mumbai's inshore waters (Kulkarni and Taherizadah, 2002)

Nitrite NO2-N: Pre-monsoon values were (1.74-2.56 g/L), monsoon values were (1.44- 4.32 g/L), and post-monsoon values were higher (2.13–3.88 g/L). Nitrate's lower levels fall within acceptable ranges.

Phosphate PO4: Before to the monsoon, PO4 levels were between 0.42 and 0.51 g/L, during the monsoon, 0.48 to 0.62 g/L, and higher during the post-monsoon (0.52 to 0.71 g/L). Increased values were seen in the post-monsoon low tide waters, which may be related to precipitation.

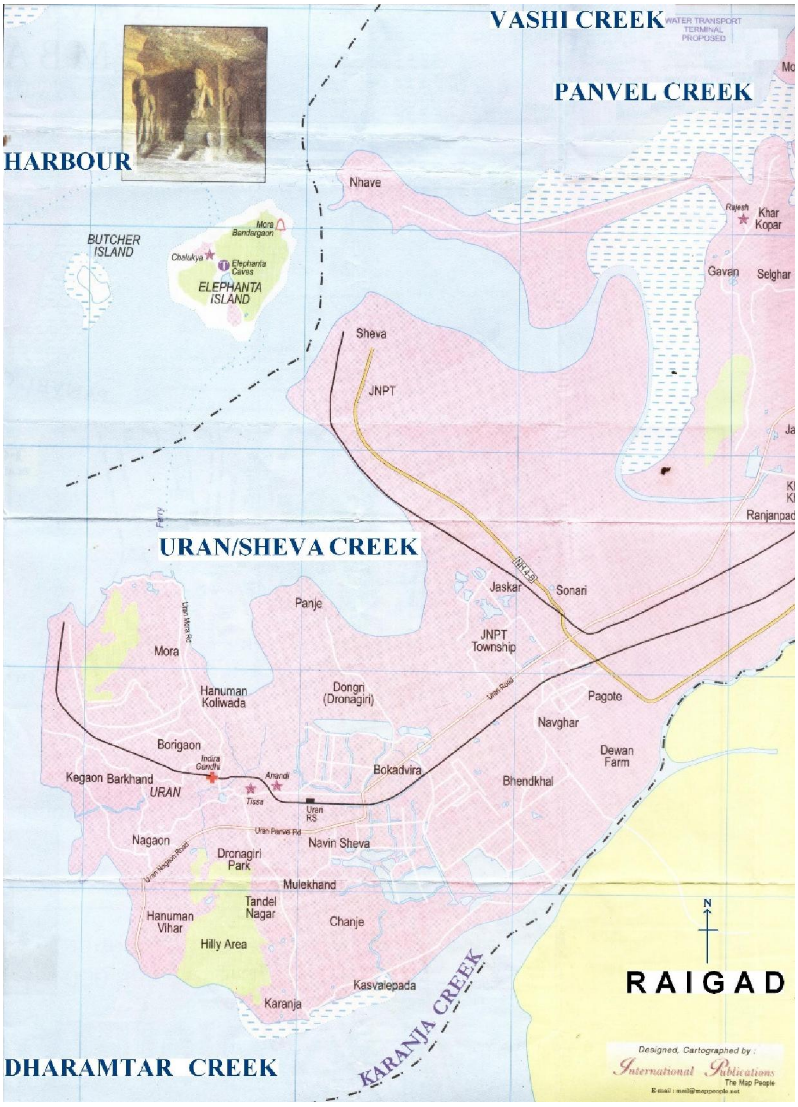
Silicate SiO4: During the monsoon, higher silicate levels were observed. In contrast, silicate levels in high tide waters were found to be low before and after the monsoon. Pre-monsoon values ranged from 35.56 to 47.58 g/L, monsoon values ranged from 58.88 to 66.42 g/L, and post-monsoon values ranged from 28.74 to 44.86 g/L, which was higher. The rising impact of construction activity is the cause of high silicate values (Quadros et al., 2001). High levels of silicates during the monsoon must also be caused by a freshwater inflow into the creek (Tripathy et al., 2005).

Salinity: Pre-monsoon values were (30.20-36.86ppt), monsoon values were (20.14-.25-33.86ppt), and post-monsoon values were greater (23.64- 26.86ppt). During the monsoon, salinity was comparatively quite low, whereas pre- and post-monsoon times had greater salinity readings. Pre-monsoon salinity measurements made here are consistent with those made in Mumbai area creeks (NIO, 1992). Low salinity documented in Shewa Creek is caused by monsoon runoff and wastewater discharge into the creek (Ram and Zingde, 2000, Swami et al, 2000,).

Conclusion: The water in Shewa Creek is currently fairly clean. The number of contaminants is within the creek's carrying capability. There was no discernible anthropogenic impact on the seasonal fluctuations in the physical and chemical variables. There is a need for ongoing observation given the projects under development and the rapidly growing urbanisation in the area.

Acknowledgement: The author is thankful to CDC of Veer Wajekar Arts, Science and Commerce College, MahalanVibhag, Phunde for financial assistance. The author is grateful to Principal P. G. Pawar and faculty members of department of Zoology of Veer Wajekar Arts, Science and Commerce College, MahalanVibhag, Phunde for support and encouragement.

IV. STUDY AREA MAP



REFERENCES

[1] Athalye R. P., N. N. Patil, U. Borkar, Goldin Quadros and V. U. Somani (2003) Study of Flora, Intertidal Macrobenthic Fauna and Fishery of Ulhas River Estuary and Thane Creek to assess the pollution status and decide mitigative strategy. B. N. Bandodkar College of Science, Thane and MMRDA Mumbai project, 211pp.

[2] Hossain, M. M., Mahmood N. and Bhouyain A. M. (1988). Some water quality characteristics of the Karnafully river estuary. Mahasagar 21(3) :183-188.

[3] Josanto, V.and Sarma R. V. (1985). Coastal circulation off Bombay in relation to waste water disposal, Mahasagar, Bulletin of the National Institute of Oceanography Goa, India, 18(2):333-345.

[4] Kulkarni, B.G. and Taherizadah M. R. A. (2002). Nutrient level of coastal waters in andaround Mumbai (Bombay). Paper presented at the South Asia regional Workshop on'Assessment of Material Fluxes to the Coastal Zone in South Asia and Their Impacts'Negombo, Sri Lanka. pp. 141–145.

[5] Lala K.D. (2004) Water Supply of Thane Municipal Corporation, Proceedings of One Day Seminar on- Pollution of Water Bodies In urban Area (case Study), Vidya Prasarak Mandals Polytechnic, Thane. Sponsored by AICTE, N. Delhi, 6-9pp.

[6] NIO, (1992). Marine environmental studies: Environmental quality along northwest coast of India, (National Institute of Oceanography Goa, India). pp. 165.

[7] Pawar, Prabhakar R. B. G. Kulkarni (2007)Assessment of water quality in Karanja creek (Dist-Raigad), Maharashtra, west coast of India J. Ecophysiol. Occup. Hlth.

[8] Pawar, Prabhakar R., 2013. Monitoring of impact of anthropogenic inputs on water quality of mangrove ecosystem of Uran, Navi Mumbai, west coast of India. Mar. Poll. Bull., 75: 291-300.

[9] Quadros, Goldin, Vidya Mishra, Vidya Ullal, Gokhale H. S. and Athalye R. P. (2001). Status of water quality of Thane creek (India). Ecology, Environment and Conservation 7(3): 17–22.

[10] Ram Anirudh and Zingde M. D. (2000). Interstitial water chemistry and nutrient fluxes from tropical intertidal sediment. Indian J. Mar. Sci. 29: 310-318.

[11] Rathod Sudesh D., N. N. Patil, Goldin Quadros and R. P. Athalye (2002) Qualitative Study of Fin Fish and Shell Fish Fauna of Thane Creek and Ulhas River Estuary. Proc. The National Seminar on Creek, Estuaries and Mangroves – Pollution and Conservation, Nov; 135-141pp.

[12] Rathod Sudesh D., N. N. Patil (2009) Assessment of rome hydrological parameters of Ulhas River Estuary, in the vicinity of Thane city, Maharashtra state J.Aqua.Biol., 24(2), 103 –108.

[13] Subba Rao M. V., Rao B. M. G., Rao B.R. and Nanda N. K (1981). Hydrological studies of the brackish water Chilika lagoon, Orissa. Journal of Environmental Biology 2:59-62.

[14] Swami, B. S., Suryawanshi U. G. and Karande A. A. (2000). Water quality status of Mumbai (Bombay) harbour – an update. Indian J. Mar. Sci 29:111–115.

[15] Valdes, D. S. and Real E. (2004). Nitrogen and phosphorus in water and sediments at Ria Lagartos coastal lagoon, Yucatan, Gulf of Mexico. Indian J. Mar. Sci 33(4): 338–345.

[16] Tripathy, S. C, Ray A. K., Patra S. and Sarma V.V. (2005). Water quality assessment ofGautami-Godavari mangrove estuarine ecosystem of Andhra Pradesh, India duringSeptember 2001. Journal of Earth Systemic Science 114(2):185–190.

[17] Zingde, M. D. and Sabnis M. M. (1994). Pollution induced tidal variability in water quality of Mahim estuary. Environment and Applied Biology, pp. 277 – 298.

[18] Zingde, M. D. and Govindan K. (1997). Health status of the coastal waters of Mumbai and regions around. Paper presented at the Symposium on Costal cities in India. Organized by Indira Gandhi Institute of Development Research, Mumbai, India.