

Monitoring the Seasonal Variations and Tidal Influence in the Water Quality of Kallai Creek

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Abstract— Water is the most abundantly found resource on this planet and the most wanted resource too, yet knowingly or unknowingly we tend to pollute it. Kallai, though known as the bride of Arabian Sea, has lost its prominence due to the toxic levels of pollution it is carrying. Once, it was known for its timber trading routes from Nilambur to Beypore. The body of water has come to a dangerous phase that any further pollution without any initiative in saving it might dry up the entire water body. The changes in water levels are drastic from a high to low tide. Being linked to the sea, silting is prominent here and also silts are carried by the man-made canal that carries most of the city's wastes. This project aims at monitoring the water quality of the creek, and suggesting suitable and necessary mitigating measures.

Keywords—High tide, Kallai river, Low tide, Mitigation measure, Organic loading, Sediment analysis, Water quality parameters

1 INTRODUCTION

Rivers are the lifeline of an area. A river is a natural flowing watercourse, usually freshwater, flowing towards an ocean, sea, lake or another river. In some cases, a river flows into the ground and becomes dry at the end of its course without reaching another body of water.

Kallai is one of the rivers in Kerala, India. It originates in Cherikkulathur in the Western Ghats, at an altitude of 45 meters (148 ft) and is 40 km (24.90 m) long. It is linked to the Chaliyar by a man-made canal on the south side of the small timber village of Kallai lying on its banks. Long ago, the logs and timber from the Nilambur forests were tied together and rolled into Kallai. This method of transporting logs was easier. But now, even the movement of small boats through this river is difficult, due to the presence of silt. Earlier Kallai was known to be the lifeline of Kozhikode, but now its dying due to the toxic levels of pollution it faces. The disposal of hospital wastes and wastes from septic tanks into the river has polluted it. Another problem is the encroachment of the land around the area by land owners. With the deposition of silt and clay, the continuous flow of the river has been interrupted.

Thus, this study aims at monitoring the river water quality and analysing the silt deposition and its effects on the quality of river water. This paper presents the first part of the project where the water and sediment quality is tested for a monsoon and pre-monsoon season of both high and low tides and compared to get the differences. Later on mitigating measures will be suggested to overcome the hurdles.

Jury and Vaux (2007) point to the fact that human use of freshwater and degradation of freshwater quality have now reached a point where shortage of safe water is likely to limit food production, ecosystem function, and systems of urban water supply[5]. Compound specific physico-chemical properties influence the behaviour of organic micro pollutants in the

water cycle and have to be taken into account together with the characteristics of the studied environment[1].

2 METHODOLOGY

2.1 Sample Collection

Samples are collected from selected points of major discharges. Six cross sections were selected for sampling of which 3 points each were taken as one from each banks and one from the center. The samples were collected in the first high tide and the second low tide. Sample collection for pre-monsoon and monsoon seasons are done.

2.2 Selection of sample points

All sample points were selected taking into consideration the possibility of the points in having maximum and minimum contaminant concentration. Each point selected had the presence of some or the other discharges such as wastes from wood industries nearby, flow from the Canoli canal at one point, presence of fecal discharges, domestic and septic wastes from households, plastic accumulation on the mangrove sides, old concrete wastes from demolished old Kallai bridge etc..

2.3 Tests on water

Several tests were done on the water samples. To analyse the physico-chemical properties, turbidity, TDS, pH, conductivity were done and to analyse the organic loading concentration of nitrate, nitrite and phosphorous were done. Water samples were collected during both high and low tides. Samples were taken from east and west sides of the ocean near to the mouth of the river along with those from the body.

2.4 Sediment analysis

All sediment samples collected were tested for conductivity, pH and their organic loading concentration. For the organic loading, nitrite, nitrate and phosphate were tested.

The samples were collected from six separate cross sections. Three points each were taken in each cross section for sample collection. Samples from left bank, right bank and centre of the river were collected. Samples were taken from the ocean also for the quality comparison and analysing the sediment deposition.

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3 RESULTS AND DISCUSSIONS

The above mentioned tests were done in the samples and the variation graphs were plotted.

3.1 Organic loading in Water Samples

The organic loading in the water were obtained for monsoon and pre-monsoon season.

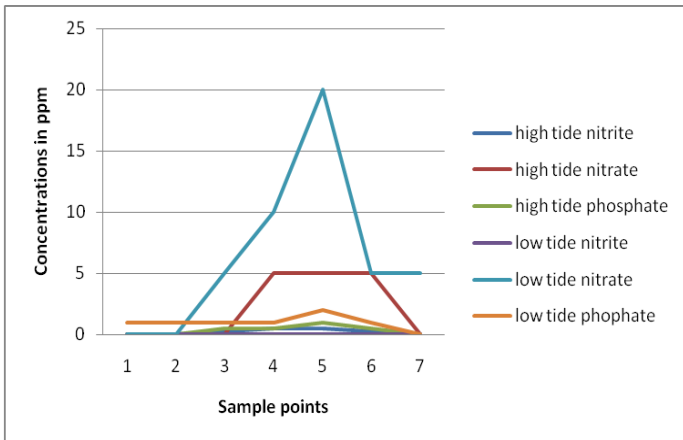


Fig. 1 Organic loading in water during pre-monsoon

The nitrite concentration during the low tides were below detection level. Also, the phosphate levels in water were low during the high tide than low tide.

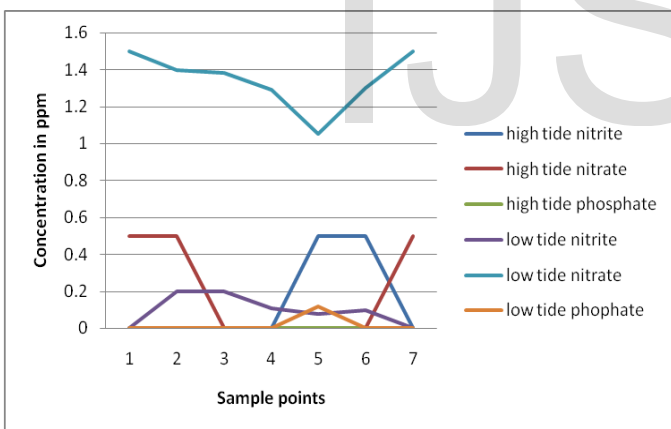


Fig. 2 Organic loading in water during monsoon

The nitrite concentration during the low tides were very high compared to the other parameters. Tidal influence was insignificant during the monsoon due to flushing of heavy rain. Also, the phosphate levels in water were low during the high tide than low tide.

4 CONCLUSION

The organic concentration in the water vary with high and low tides within both the seasons. The nitrate concentrations are higher near the point where the Canoly canal meets the Kallayi river. The phosphate concentration were below detection level and nitrite kept varying in tides and but the the pattern of variation remains the same in both monsoon and pre-

monsoon seasons.

The main reason for the nutrient loading are the local land drainage and not from the sea water. Sand and coarser material dominates the sediments from the river. But the farther the distance from the mouth of the river the sediments are mainly constituted by clay like silt and oyster filled bed rocks. The main reason for the slower flow and pollution of the river is the absence of dredging in the zone. The configuration of the sediment to be dredged is expected to be high in mud silt and clay.

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