

# PHYSICO-CHEMICAL ANALYSIS AND CURATIVE APPROACH TO MUTHA RIVER POLLUTION

Pravin A. Manatkar<sup>1</sup>, Anuj S. Chordia<sup>2</sup>, Roche H. Harry<sup>3</sup>, Sanket S. Sharma<sup>4</sup>, Rajkumar I. Kothari<sup>5</sup>,  
Akshay A. Arote<sup>5</sup>

<sup>1</sup>Assistant Professor, Civil Engineering Department, Trinity Academy of Engineering, Pune

<sup>2-6</sup>Student of B.E (Civil Engineering), Trinity Academy of Engineering, Pune, Maharashtra, India.

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**Abstract-**Mutha River in Pune (India) is one of the most vulnerable water bodies to pollution because of its role in carrying municipal and industrial wastes and run-offs from agricultural lands in its vast drainage basins. The restoration of river water quality has been a major challenge to the environmental managers. The aim of the work under the title was to analyze the river by dividing it into 5 sampling station. The water sample was collected near Khadakwasla, Rajaram Bridge, Mhatre Bridge, S.M. Joshi Bridge and Sambhaji Bridge. The present study also identified the critical pollutants affecting the river water quality during its course through the city. Treatment units to treat high COD level in the river and feasible location of these units were successfully designed in the work.



Figure 1: Location of sampling stations

**Keywords:** Water pollution, Mula Mutha River, Industrial Effluent, Domestic Sewage, Agriculture Runoff, Physico-chemical characteristics, COD.

## 1. INTRODUCTION

The river covers the rural area of Pune in the initial stage hence it receives agricultural run-off in a large proportion, the disposal of waste, burning of fossil fuels, discharge of domestic wastes, hospitals and industrial effluents from small and large scale industries which are located at the bank of the river. This pollution also creates unhygienic and unaesthetic conditions.

Increased urbanization coupled with industrialization during the past few decades are depleting water ecosystem irreparably in Pune. Studies on the river water quality are an essential step to protect useful natural water resource. Untreated toxins such as domestic detergents and other cleaning products, which enter the river, make the water more harmful, killing the fauna and flora of the river. It is necessary to study the physico-chemical characteristics of the river and adopt suitable remedial approach to this issue; contaminated water is the biggest health risk and continues to threaten both quality of life and public health. Necessary approach must be taken to combat the waste water before it enters the river by means of treatment units to reduce the load on the self purification of the river.

## 2. LITERATURE REVIEW

Research papers being national and international all emphasize on the deteriorating nature of the river through the flow in Pune city. Water quality decreases with the flow. Various parameters like pH, temperature, chlorides, phosphorus, turbidity, solids, BOD, COD, dissolved oxygen were studied and analyzed in the papers. Effects of the water pollution on the flora and fauna in and around the river also briefly studied.

## 3. METHOD

The water quality was analyzed per station on daily basis for 7days with sample collection done thrice a day. The water parameters change during the time of the day and thus samples were collected in the morning, afternoon and evening to maintain accuracy in the test results.

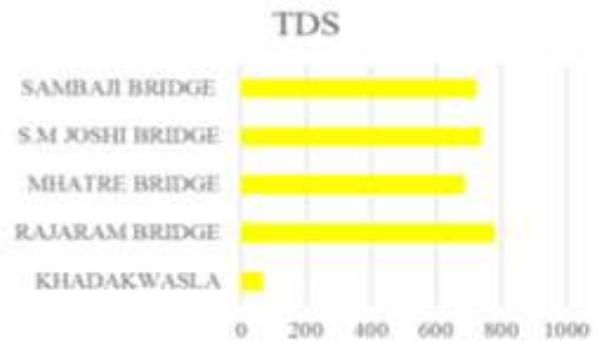
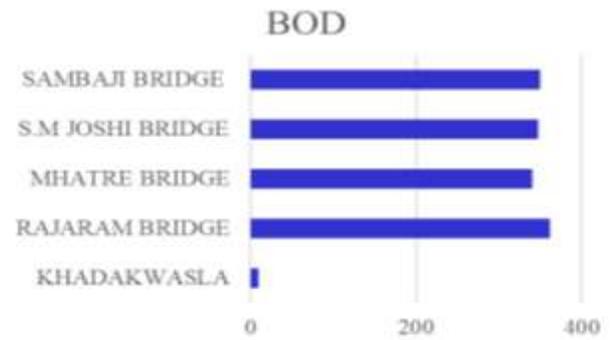
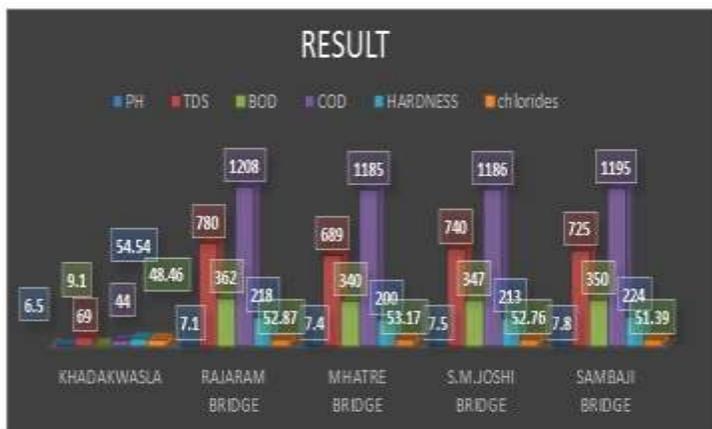
The results were used to design the treatment units. The river has prominent locations of sewers that enter the river. Treatment of this water flow results in water entering the river that can be treated completely by self purification of the river. Flow of water is calculated by considering the population and water supply from the area. Starting with screening which removes large floating matter from the flow and reduce the inorganic matter. Sedimentation tank settles the small size particles and the remaining inorganic and organic matter present in the water are treated by the process of advanced oxidation by hydrogen peroxide.

### 4. RESULT

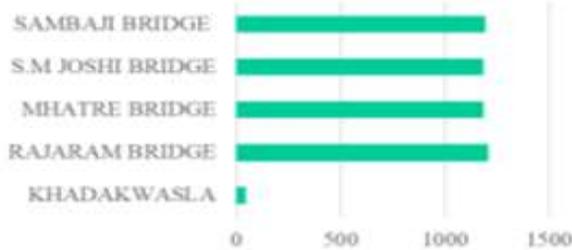
Water Analysis result states that the river deteriorate as it flows through the city and the water quality near the first station Khadakwasla varies drastically as compared to the other stations. Parameters like pH, temperature and dissolved solids are within the limits stated by the Maharashtra Pollution Control Board (MPCB). Levels of BOD And COD are way above the permissible limits.

Treatment units for high COD to BOD ratio are designed keeping in mind the feasibility of the project.

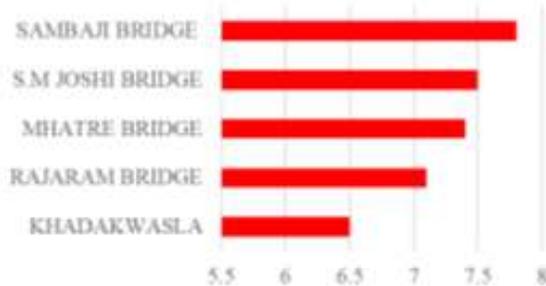
#### 4.1 Water Quality Results



#### COD



#### ph



### 4.2 Details of Designed Units

#### 4.2.1 Bar Screen

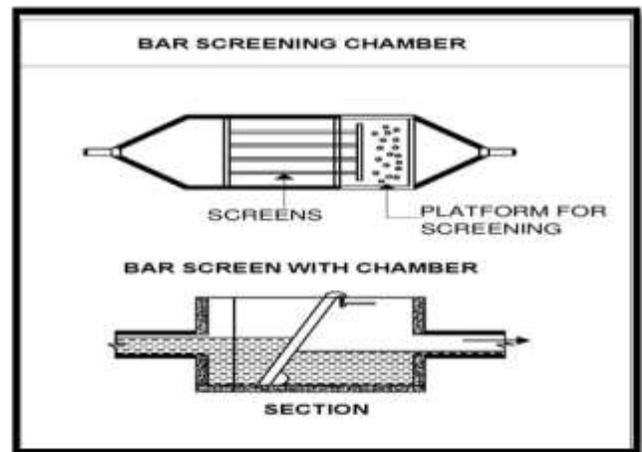


Figure 2

#### Bar details (adopted)

Width	Height	Spacing
10mm	50mm	40mm

4.2.2 Sedimentation Tank

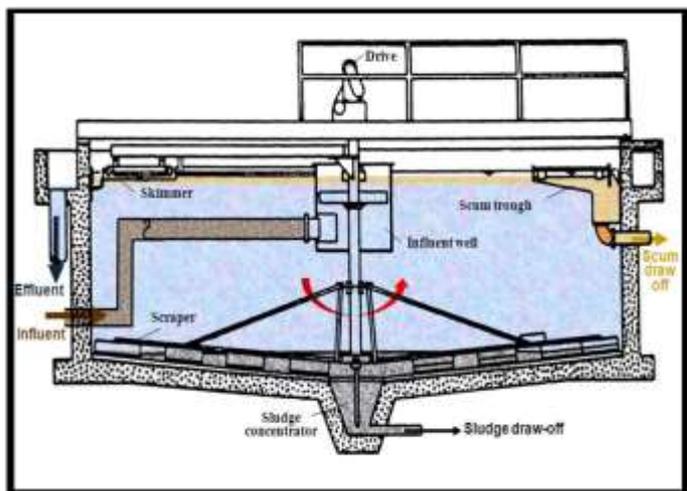


Figure 3



Figure 4: Location of Units

Dimensions of sedimentation tank

Outside Diameter	3.44m (A)	2.82m (B)	5m (C)
Inside Diameter	3.24m	2.62m	4.8m
Height	4.5m	2.7m	4.5m

4.2.3 Advanced Oxidation



Before

After

Figure 5: Advanced Oxidation with Hydrogen Peroxide

5. CONCLUSION

During the course of the project study, following conclusions were derived:

The BOD and COD limits of the river are above their permissible limits, whereas pH and TDS were found to be within the limits as per the MPCB

The river has identifiable locations of sewers entering thus leading to increase in the pollution levels.

Primarily treating of the water will lead to decrease in the pollutants.

Based on the location, availability of land and cost analysis treatment comprising of screening, sedimentation and followed by advanced oxygen is found to be feasible.

Natural self cleansing of the river can be achieved by reducing pollutant entry.

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