ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

IARJSET

International Advanced Research Journal in Science, Engineering and Technology

Conference on Advances in Civil Engineering 2018 (CACE-2018)

Thakur College of Engineering and Technology, Thakur

Vol. 5, Special Issue 3, February 2018

Assessment and Evaluation of Water Quality of Dahisar River

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Abstract-Water is a prime natural resource, a basic human need and a precious national asset for any Country, and also belongs to a larger system. No life on earth can exist without water, and the Ceaseless flow of that water cannot exist without rain. The world's fresh water resources are unequally distributed both in time and space. The available water is dwindling due to various reasons such as scanty rainfall, population growth, and increased per capita water use, ill management of water supply and distribution, improper reservoir operation policies. To face this situation, a holistic approach is needed. Dahisar River is a river on Salsette island that runs through Dahisar, a suburb of Mumbai, India. It originates at the spillway of the Tulsi Lake in the Sanjay Gandhi National Park in the northern reaches of the city. The River flows roughly North-West for a total of 12 kilometres through the localities of the National Park, Sri Krishna Nagar, Daulatnagar, Leprosy Colony, Kandar Pada, Sanjay Nagar, and Dahisar Gaothan before meeting the Arabian sea via the Manori Creek. Its total Catchment area is 3488 hectares. The Dahisar River water samples for five locations were collected for analysis in the month of August 2017 (Monsoon period). The water samples were tested and analysed for five critical water quality parameters viz., pH, Turbidity, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chloride content. The analysis and evaluation of the collected Dahisar River water samples was done in "Environmental Engineering Laboratory"of Thakur college of engineering and technology. The results are compared with standard desirable values.

I. INTRODUCTION

Drinking water quality in national context

Ensuring the supply of safe drinking water in India is a constitutional mandate, with the Article 47 conferring the duty of providing clean drinking water and improving public health standards to the state. In recent years High Courts around the country have been recognizing the right to safe drinking water as a fundamental right. According to the Constitution of India, water supply is a State subject. The Union Government is only responsible for setting water quality standards. State Governments have established departments or special agencies for supply of domestic water in urban and rural areas also responsible for monitoring the quality of the water supplied. The National Water Policy (2002) of India also emphasizes through a generic statement – „both surface water and ground water should be regularly monitored for quality. A phased programme should be undertaken for improvements in water quality". Since the First Five-Year Plan in 1951, investments made in water and sanitation have been estimated at Rs.1105 billion. Yet, it has been estimated that around 37.7 million Indians are affected by water- borne diseases annually, 1.5 million children are estimated to die of diarrhoea alone and 73 million working days are lost due to water-borne diseases each year17. The resulting economic burden is estimated at US$ 600 million a year18. Clearly, the health benefits in terms of reduction in water-borne diseases have not been commensurate with the investments made

Water quality monitoring and assessment in India

The first step towards ensuring safe drinking water is to generate reliable and accurate information about water quality. Several government institutions and departments are involved in water quality monitoring, leading to overlapping of functional areas and duplication of efforts. While the State Pollution Control Board laboratories and the Central Pollution Control Board (CPCB) regularly monitor surface water bodies. In order to monitor the surface water quality, the CPCB started a national water quality monitoring programme in 1978 under the Global Environmental Monitoring System (GEMS). It started with monitoring 24 surface water and 11 groundwater sampling stations across India. Parallel to GEMS, a National Programme on Monitoring of Indian National Aquatic Resources (MINARS) began in 1984. At present, a network comprising 870 stations 16 million samples need to be tested annually following a norm of one sample for every 200 persons. Even a basic requirement like the capacity to monitor bacteriological quality of water is grossly inadequate

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in some states. The district- level laboratories are mostly understaffed and hence standard norms of sample collection, storage and analysis are grossly violated. Thus monitoring is the weakest link in the system that works to provide safe water in rural India. on rivers, water bodies and subsurface water (Central Pollution Control Board 2003) is in place. However, as on date less than 50% of all the rural water sources were analysed by the district laboratories in many states of India due to lack of adequate manpower. The enormous task of collecting water samples from remote sources and transporting them to district laboratories often becomes a tedious task, as they are usually situated hundreds of kilometres away from the source. The Public Health Engineering Department (PHED) runs district laboratories in every district, which are entrusted with the task of collecting and analysing the samples. However, these laboratories are inadequately equipped both in terms of manpower and infrastructure when compared to the scale of required operation. It has been estimated that that 16 million samples need to be tested annually following a norm of one sample for every 200 persons. Even a basic requirement like the capacity to monitor bacteriological quality of water is grossly inadequate in some states. The district-level laboratories are mostly understaffed and hence standard norms of sample collection, storage and analysis are grossly violated. Thus monitoring is the weakest link in the system that works to provide safe water in rural India.

II. SCOPE OF PRESENT STUDY

Water quality is a complex subject which involves physical, chemical, hydrological and biological characteristics of water and their complex and delicate relations. From the user's point of view, the term "water quality" is defined as "those physical, chemical or biological characteristics of water by which the user evaluates the acceptability of water". For example for drinking, the water should be pure, wholesome and potable. Similarly, for irrigation dissolved solids and toxicants are important, for outdoor bathing, pathogens are important and water quality is controlled accordingly. Textiles, paper, brewing and other industries using water, have their specific water quality needs.

The specific objective of the present study are:

1. To analyse the quality of the Dahisar River water with critical parameters in the identified stretches.
2. Compare water quality with desired classes of water for beneficial use.
3. Project quality of river water in the identified stretch if effluents are either diverted or discharged after adequate treatment only.

Government plan: Chief Minister Devendra Fadnavis recently announced that the government would implement a programme to tackle river pollution in the state. However experts say the project does not focus on urban rivers that are in dire"The rivers and drains in ay India city have become surrogate sewer systems ad these drains mainly receive grey water and sewage along with occasional runoff water ad Mumbai is on exception .Ultimately the drains outfall into a creeks via mangrove forests transmitting their heavy pollution load into them I case we do not take any action to salvage these rivers own these rivers will dry up and leave o sigs of their existence leaving Mumbai with a huge water ad environmental crisis the groundwater . The groundwater levels of Mumbai are already quite low the government needs to deal with this issue on a urgent basis ad discuss various existing decentralised options with experts and other stakeholders and do it o a pilot test basis to move further.

III.PROCEDURE DETERMINATION OF DISSOLVED OXYGEN

Principle

For estimation of DO content in a sample, an iodide added to the sample is oxidized under acidic conditions to free iodine. The amount of free iodine liberated is equivalent to the amount of DO originally present in the sample. (the liberated iodine is estimated by titrating against standardized sodium thiosulphate using starch as an indicator) the amount of free iodine estimated is a measure of dissolved oxygen in the sample.

1. DO determinations at various points along a river course is carried out to define the pollution of the river. DO level of more than 3mg/l (or 40% saturation value) is desirable for the existence growth of fish and such other forms of aquatic life. (It is usual to find DO in the range of 6-8mg/l in normal flowing river water). .
2. DO measurements are important for maintaining aerobic conditions in aerobic biological treatment Units.
3.Determination of DO is the basis of the BOD test.
4. DO values are used to control corrosion of iron and steel water distribution systems and steam boilers.

DETERMINATION OF BOD

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Principle – A known volume of a sample of wastewater, diluted using specially prepared distilled water, is incubated at 20oC for 5 days. DO depletion in the test sample is a measure of a fair amount (68%) of biodegradable organic matter in the sample. To avoid getting a zero 5-day BOD, a dilution technique is adopted.

DETERMINATION OF PH

Principle -The pH electrode used in the pH measurement is a combined glass electrode. It consists of sensing half-cell and reference half-cell, together form an electrode system. The sensing half-cell is a thin pH sensitive semi permeable membrane, separating two solutions, viz., the outer solution, the sample to be analysed and the internal solution, enclosed inside the glass membrane and has a known pH value. An electrical potential is developed inside and another electrical potential is developed outside, the difference in the potential is measured and is given as the pH of the sample.

DETERMINATION OF TURBIDITY

Principle -Turbidity is based on the comparison of the intensity of light scattered by the sample under defined conditions with the intensity of the light scattered by a standard reference suspension under the same conditions. The turbidity of the sample is thus measured from the amount of light scattered by the sample taking a reference with standard turbidity suspension. The higher the intensity of scattered light the higher is the turbidity. Format in polymer is used.

TEST	RESULT	LIMIT
PH	7.75	6.5-8.5
TURBIDITY	8.6NTU	5NTU
DO	5.6MG/L	4.62MG/L
BOD	2MG/L	6MG/L

IV. CONCLUSION

The average range of the pH is 7.75 and is well within the standard desired limit. Average value of turbidity is 8.6 NTU which is far greater than 5 NTU and indicates bacterial contamination. The average value of Dissolved Oxygen (DO) is 4.62 mg/L and is good in terms of water quality.

REFERENCES

[1] S. K. Pathak et al. (2015) determined the water quality index of the River Bhagirathi in Uttarkashi, Uttarakhand, India for public use, recreation and other purposes. Eleven parameters like pH, EC, TDS, Chlorides, Nitrates, BOD, Total alkalinity, Sulphate, DO, TSS, TH were analysed. Their finding show that the river water is not suitable for drinking and pollution load is comparatively high during rainy and summer seasons. They suggested highest priority to be given for water quality monitoring and indigenous technologies used for water treatment before consumption.

[2] An indicator system for surface water quality in river basins was reviewed by R. E. S Olivera et al. (2005). They stated the need for developing a surface water quality indicator system as a tool for assessment of human activities on natural water. Their study briefly described the various factors to be considered, procedures to be adopted, problems in formulation and the intended use of the parameters identified.

[3] Dr. Seema Tiwari (2013) has reviewed the water quality parameters and considered six studies for her review. The parameters she reviewed in context to water quality were pH, Colour, BOD, COD, TSS, TDS, and Turbidity.

[4] Water quality assessment of the River Godavari, at Ramkund, Nasik was made by Manjusha Bhor et al. (2013). Water quality of Godavari River was assessed during the months of June to October 2012, at three different locations, to ascertain the impact of human activities on the water quality parameters viz., pH, Temperature, Chlorides, TSS, TDS, TH, DO, BOD