



INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK



SPECIAL ISSUE FOR NATIONAL LEVEL CONFERENCE "Technology Enabling Modernization of Rural India (TMRI- 2018)"

WATER QUALITY STATUS FOR YAMUNA RIVER

S. K. DUBEY, ROHIT MAURYA

HCST, Farah Mathura

Accepted Date: 19/03/2018; Published Date: 01/04/2018

Abstract: The present study carried out to analyze the water quality of Yamuna River from four different sites in Agra city. River water samples collected from various locations such as Balkeshwar, Rambagh, Etmad-ud-daula, and Tajganj of Agra city, during the month of March and April 2017. All river water samples collected and analyzed in campus laboratories. The analysis has been done based on the parameters like pH, Total Suspended Solids, Total Dissolved Solids, Dissolved Oxygen, COD, BOD and pH shows the present status of water of Yamuna River.

Keywords: Physio-chemical Properties, Yamuna Water, Environmental Impact.



PAPER-QR CODE

Corresponding Author: S. K. DUBEY

Access Online On:

www.ijpret.com

How to Cite This Article:

S. K. Dubey, IJPRET, 2018; Volume 6 (8): 277-284

INTRODUCTION

The present scenario of water scarcity is one of our absolute concerns to face. It is known that day by day availability of fresh water is decreasing in Agra city. The available quantity of re-usable water is also reducing due to the increasing pollution. The basic area of water resources are River water (surface water) and ground water (base water). These are the main water availability sources, though which water can be utilized. So, it is important to have water quality status of Yamuna River regularly. As, we know that Yamuna River is one of the main water resources of Agra City. So, it is our prime responsibility to have a proper understanding of its day to day condition. Weather, it is in the condition to remain one of our prime resources of fresh water supplies.

In this paper we discuss about various aspects of Yamuna River water. It is to assess a better view for further study and future scope water availability. Taking in mind, the present water demand of Agra city, it is necessary to make Yamuna River pollution free by analyzing the water quality periodically.

LITERATURE REVIEW

At the request of GOI, Government of Japan agreed to extend the loan for another two years from 2000 to 2002 and the project was termed as Yamuna Action Plan II (YAP – II). During the extended period, ongoing works would be completed along with some remedial works to enhance the effectiveness of the project. Yamuna Action Plan was framed to prevent pollution of river Yamuna. Its main objective was to improve the water quality of river and restore it to the desired bathing class. It envisaged pollution abatement schemes in 21 towns of 3 states. Pollution from domestic sewage is tackled under Yamuna Action Plan, whereas pollution of industries is monitored and controlled under the existing environmental laws. The main focus under YAP is on: Laying of trunk & Intercepting sewers, for diversion of sewage outfall into the river and Construction of Sewage Treatment Plants to treat the captured sewage.

Non point sources of pollution to be addressed by: Providing electric/improved wood based crematoria to minimize the river pollution on account of disposal of un-burnt dead bodies. Constructing low cost toilets, so that public resist from resorting to open defecation. In addition, activities such as river front development, plantation along the river and public participation and awareness works have been taken up under the program.

POLLUTION IN YAMUNA RIVER

The severe condition of Yamuna River is serious issue. The pollution in the form of solid waste, industrial influents, Hazardous waste and other waste. As we can see in the picture Yamuna River is covered with all kind of waste.



Fig-1 Pollution behind the Taj Mahel

- The Yamuna River passing through 22 km in Delhi was once described as the lifeline of the city, but it has become one of the dirtiest rivers in the country. The reason:
 - Delhi generates about 3,267 million liters per day (MLD) of sewage while the city's installed waste water treatment capacity is only 2,330 MLD. More than 937 MLD of waste is treated. Out of Delhi's 2,330 MLD treatment capacities, 37 percent is under-utilized and 1,270 MLD of sewage is untreated and allowed to enter the river every day.
 - The Yamuna's 22-km stretch in Delhi is barely 2 percent of length of the river, but contributes over 70 percent of the pollution load.
 - Pollution levels in the Yamuna have risen. Biochemical oxygen demand (BOD) load has increased by 2.5 times between 1980 and 2005 from 117 tons per day (TDP) in 1980 to 276 TDP in 2005.
 - Delhi discharges about 3,684 MLD (million liters per day) of sewage into the Yamuna.
 - The faecal coliform count, which indicates the presence of disease causing micro-organisms, is nearly 25,000 times more than the limit prescribed for bathing.
 - Delhi and Agra together account for 90 percent of the pollution in the river.
 - The Capital has 16 drains discharging treated and untreated wastewater/sewage into Yamuna.
 - The Najafgarh drain contributes to 60 percent of the total wastewater and 45 percent of the total BOD load being discharged from Delhi into the Yamuna.

OBJECTIVE AND COMMAND AREA OF PROJECT

Measuring various water quality parameters, to check the water quality of Yamuna River at four different locations. To find out issue of environmental pollution and their self-sustainable mitigations actions identification an evaluation of best suitable mitigation processes for command area. Command area for this project is Balkeshwar, Rambagh, Etmad-Ud-Daula and Rambagh.



Fig-2 Map showing Command Agra

The rate of River water abstraction from Yamuna River and type of uses is described in the table 1. Also the possible impact of local solid and liquid waste along with influents released from various local industries with their outcomes mentioned in table 2.

Table-1 Water Abstraction from Yamuna River

S.No	Location	River water abstraction approx. MLD	Abstraction Use
1	Hathnikund	20,000	Irrigation, Drinking water supply and others
2	Wazirabad	1,100	Drinking water supply
3	Wazirabad to Okhla Stretch	5,000	Irrigation and others
4	Okhla to Etawah Stretch	400	Irrigation, Drinking water supply and others
5	Etawah to Allahabad Stretch	475	Irrigation, Drinking Water supply and others

Table-2 Possible Impacts from Industry influent on River water

Sr.No.	Industries	Influent status
1.	Agro based industry	Rise in BOD, TOC, dark colour, Foul smell & compounds of Potash.
2.	Metal finishing units	Rise in compounds of Phosphates, Nickel, Chrome waste stream

3.	Domestic residential	Rise in Compounds of Phosphates, Nitrate, & BOD, TOC in habitats Waste water reports
4.	Textile industry	Rise in compounds of Phosphates, Dye,& BOD in waste stream
5.	Mathura Refinery	Can give rise to temperature along with compound of Phosphorus in water

Silting at Gokul barrage leads to accumulation of dead organic mass at bottom of river. This decomposes under anaerobic condition thus generating various organic compounds and under certain conditions ammonia.

Table-3 Environment Indicators of River Yamuna

Sr.No.	Indicators	Possible cause/explanation
1.	Free ammonia	Organic compounds particularly Proteins of anaerobic degradation releases Ammonia
2.	Blue green algae growth	For the growth of algae most important three Components are Phosphorous, Nitrogen and Potash which is being loaded from Catchment basin to river Yamuna. Creating perfect environment for algal Bloom.
3.	Aquatic life	Self-sustainability of Eco system has Broken down/ unbalanced due to uneven growth of few species, thus creating breakage in food chain, leaving Prey & predator unbalanced.
4.	Dissolved oxygen	Algae give rise in resolved oxygen during photosynthesis but absorb oxygen during night thus some time killing Aquatic life.

Social Issues

- i. During the physical survey by undersign it was found that submergence area of river is being utilized for irrigation during non-monsoon periods.
- ii. Lot of fish catching activities was also found during the visit and it was informed by occupants that they pay revenue to state government who has allotted the land.
- iii. Lot of nearby habitants pushes their cattle to river Yamuna as shown in the attached photograph.
- iv. There are few untapped or treated/untreated sewage drains falls in the river.

METHOLOGY

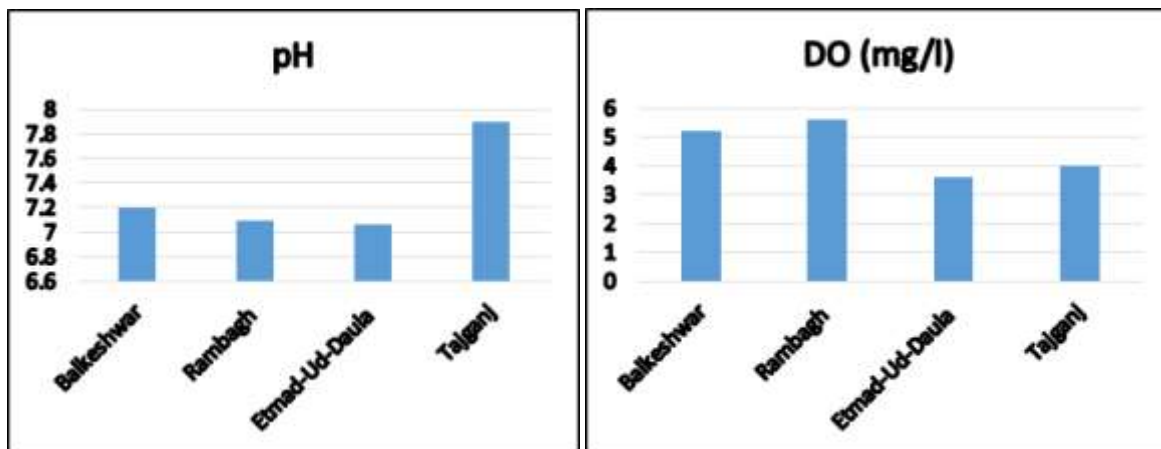
Sampling of Water

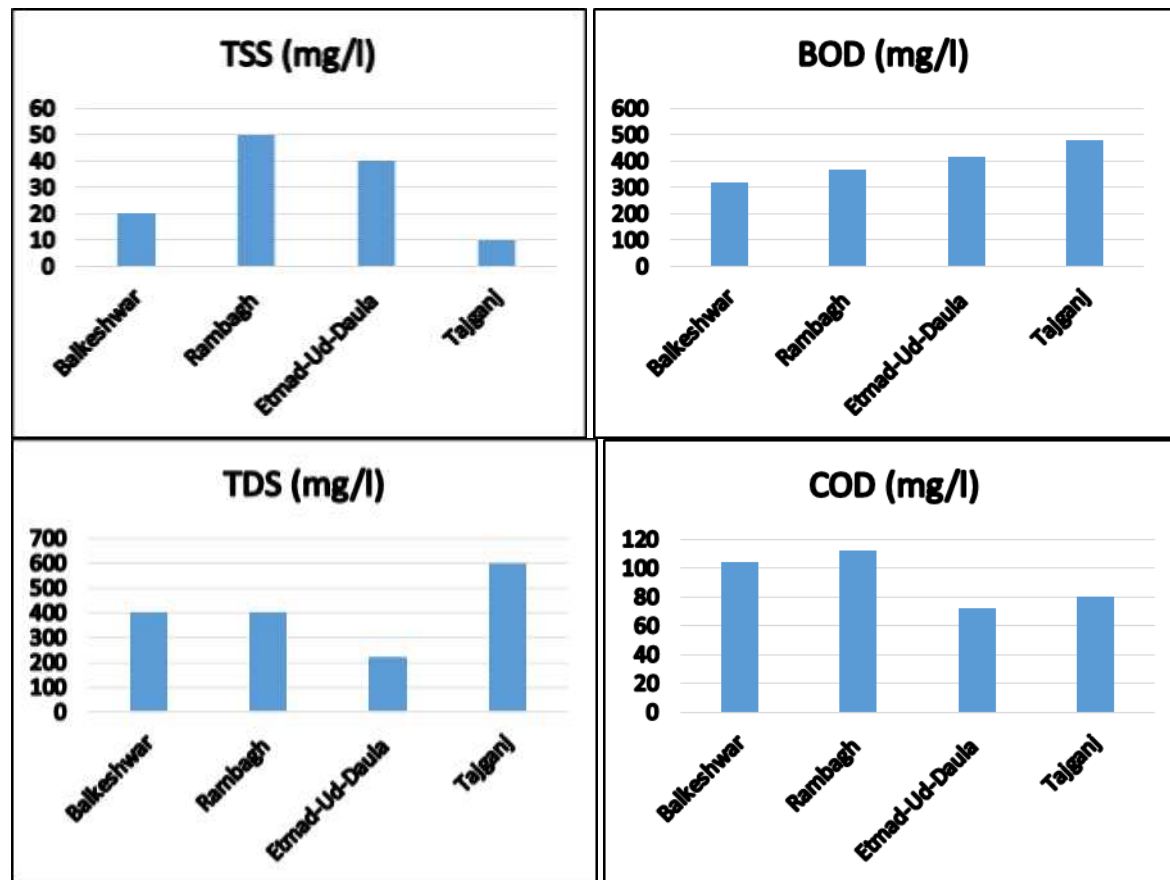
The collection of sample was done by composite methods. In this, the sample collected at a particular time and place can represented only the composition of the source at the time and place. The sample was collected in the month of March 2017 during pre monsoon. The polyethylene container having capacity of two litre was pre-soaked overnight in 10 %(v/v) nitric acid and then rinsed with the distilled water. Before filling with the sample were transported to laboratory for detailed analysis under quite precautionary procedure to avoid any accidental contamination of sample.

River quality monitoring program and methodology, during revised Yamuna river quality monitoring programmer (since 2010), total number of sampling location was increased. Water samples were pressure filtered through 0.45 μ Millipore size membrane filter. The filtered water was stored in polyethylene bottles for further analysis. The details of analytical methods were discussed below:

RESULTS AND DISCUSSION

It is needed to check the current status of Yamuna River for future relevance. Various tests have been conducted to assess the results of different physicochemical parameters of Yamuna water.





CONCLUSION

This study assessed the water quality parameter of Yamuna River water from four different locations (viz. Balkeshwar, Rambagh, Etmad-ud-daula, and Tajganj) of Agra city, during the months of March and April 2017. The analysis was carried out by taking certain important parameters like pH, electrical conductivity, total dissolved solids, dissolved oxygen, chemical oxygen demand, and bio-chemical oxygen demand. In the present investigation, it was found that the maximum parameters were at the level of pollution except few parameters like pH. Thus the study indicated that the Yamuna River in Agra city was highly polluted and unsafe for human use for the sampling time.

REFERENCES

1. Agrawal, L.K. and Kretch, C.J., Yamuna River Sustainable Pollution Control Project "Challenges and Achievements", 2006
2. Gupta N et. el. "Assessment of Physiochemical Properties of River Yamuna in Agra City". International Journal of ChemTech Research 5(1):528-531 · April 2013

3. JBIC, Yamuna Action Plan Projected-Post Evaluation Report on ODA Loan Projects 2005, <http://www.jbic.go.jp/english/oec/post/2005/index.php>
4. JBIC, Evaluation on Environmental Impact, Yamuna Action Plan Project, Ex-Post Evaluation Report on ODA Loan Projects 2005(in Japanese), <http://www.jbic.go.jp/japanese/oec/post/2005/index.php>
5. Kashyap R. et. el. "Water chemistry of Yamuna River along Ponta Sahib Industrial Hub of Himachal Pradesh of India". Res. Environ. Life Sci. 9(3) 277-281 (2016)
6. Kannel PR, Lee S, Lee YS, Kanel SR, Khan SP (2007), "Application of water quality indices and dissolved oxygen as indicators for river water classification and urban impact assessment". Environ Monit Assess 132:93–110
7. Murphy S (2007), "General Information on Dissolved Oxygen City of Boulder/USGS Water Quality Monitoring". Last Page Update–Monday April 23, 2007. Retrieved July 10, 2007, from <http://bcn.boulder.co.us/basin/data/BACT/info/DO.html>
8. Nallathiga R. "River Water Conservation through Management Interventions: A Case Study in Yamuna Action Plan in India". Water Today, pp 68-73 (May – June 2008)
9. Nema A. "Japanese Assistance for River Pollution Control -A Case Study of Yamuna action Plan, India".
10. Paliwal R, Sharma P, Kansal A (2007), "Water quality modeling of the river Yamuna (India) using QUAL2E-UNCAS". J Environ Manag 83(2):131–144Lumb A, Halliwell D, Sharma T (2006), "Application of CCME Water Quality Index to monitor water quality: a case of the Mackenzie River Basin Canada". Environ Monit Assess 113:411–429
11. Sharma M. et. el. "Impact on Industrial Pollution on Yamuna River: A Review". Published in proceedings of IInd International Conference on Environmental Management, Hyderabad (ICEM 2010): 512-521. (ISBN: 978-81-7800-252-1)
12. Sharma D, Singh RK (2009), "DO-BOD modeling of River Yamuna for national capital territory, India using STREAM II, a 2D water quality model". Environ Monit Assess 159(1–4):231–240
13. State of Environment Report for Delhi (2010), "Department of Environment and Forests, Government of NCT of Delhi Level 6, C Wing Delhi Secretariat I P Estate, New Delhi 110 002
14. Upadhyay R, Dasgupta N, Hasan A, Upadhyay SK (2010) Managing water quality of River Yamuna in NCR Delhi. Phys Chem Earth Parts A/B/C 36(9–11):372–378