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Water quality assessment of pre and post treated waste water of Indian rivers

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Abstract— **Indian rivers are facing a severe problem of pollution. Safe discharge of waste water is still a very big problem in every part of the world and mainly in developing countries. The discharge of waste water effects the physiochemical properties of water stream and soils which enter into the food chain and effects agriculture products, human health and animals as well. This study includes the analysis of the Panchaganga river and Ganga river which are highly polluted in the current scenario. The major reason this pollution is disposal of municipal sewage which is not properly treated before letting it out in the rivers.**

Keywords— Indian River, waste water effect, physiochemical properties, river water pollution

I. Introduction

Current scenario around the world is getting worse. Only 1% of water on the earth is available for human use. India is the most polluted country after china and is currently facing a lot of water problems. At the present situation, India needs 103.8 million lakhs of safe water. India is now having a problem providing that because of the major dependency was on Indian rivers, but the rivers are mostly polluted and the major reason for that is municipal sewage out in the river, human waste, agricultural pollution as well as industrial effluents [1]. The WHO report 2015 states that around 1.1 billion people don't have safe drinking water. In the following study the important parameters which are considered are Biochemical Oxygen Demand (BOD), Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), Ph (potential of hydrogen), color of water [2].

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II. Location of River

A. *Panchaganga River*

The Panchaganga river is located in Kolhapur district, Maharashtra, India. For the simulation and further analysis sample were collected from 4 stations. Station 1 was a stream of river located near Valinga pumping station which is away from Kolhapur city. Station 2 was located near PunchagangaGhat. Station 3 was located near KasbaBawada. Station 4 was located near NH 4 highway bridge [3]

B. *Ganga River*

Sites are located in the Prayagraj (Allahbad) region, Uttar Pradesh, India [1-4]. The samples were collected from the waste water treatment plant in Naine, Rajapur, Salori and Jhunsi.

Figure 1 shows the image of the rivers that were in a good and healthy conditions and the water would be used for various purposes including drinking also. It shows the current scenario of the Indian rivers that are polluted to a greater extent and the water cannot be uses for any purpose of human nor for animals and this is because of the human waste, industrial waste, agricultural waste etc. This current situation is leading to the shortage of water. Figure 2 shows

the map of the rivers that are located in Maharashtra, India [1-4].

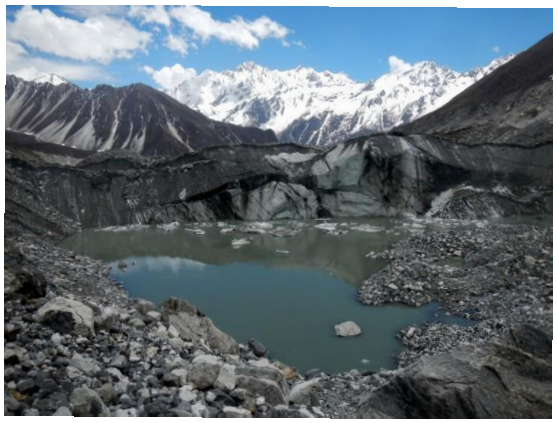

Figure 1. Clean and Healthy rivers in early age

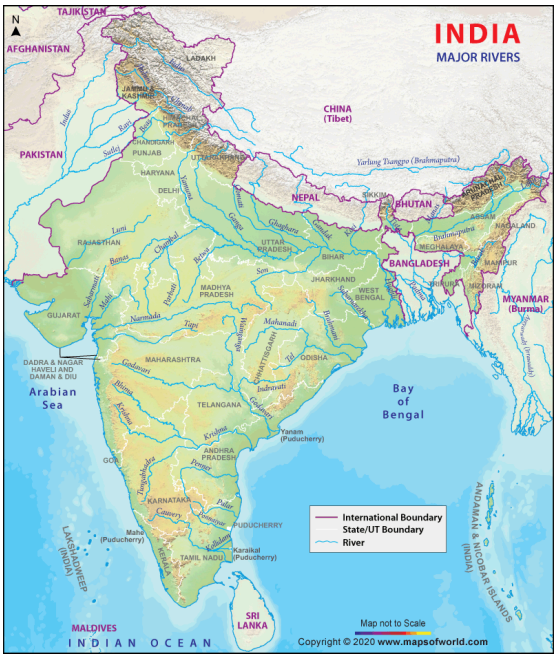

Figure 2. Map of rivers in Maharashtra, India [https://images.app.goo.gl/R4w7UPrKY9P63yBY6]

III. METHODOLOGY (PHYSIOCHEMICAL ANALYSIS)

Parameters that were analyzed for physical and chemical aspects of water are-

A. *Biochemical Oxygen Demand (BOD):* Biochemical Oxygen Demand is defined as the demand of amount of oxygen by biological organisms to break the organic matter present in water at a specific temperature.

BOD of seeded water:

$$BOD = \frac{DO_i - DO_f}{p}$$

Where;

DO_i= Initial Dissolved Oxygen

DO_f= Final Dissolved Oxygen

$$P = \frac{Vol.(waste\ water)}{Vol.(waste\ water) + Vol.(dilution\ water)}$$

BOD of unseeded water:

$$BOD = \frac{(DO_i - DO_f) - (B_i - B_f)(1 - P)}{P}$$

Where;

DO_i & DO_f = Dissolved Oxygen of mixture, initial and final values

B_i & B_f = Dissolved Oxygen of blank, initial and final values

$$P = \frac{V_w}{V_m} = \frac{Vol.(waste\ water)}{Total\ Vol.}$$

B. *Total dissolved solids (TDS):* It is the measure of all the organic and inorganic substance dissolved in the liquid in the form of molecular, ionized or micro-granular suspended form.

Suspended solids,

$$\text{mg/L} = mg/L = \frac{wt.(dry\ solid)}{sample\ volume}, 1000000$$

$$\%\ suspended\ solids = \frac{wt.(dish\ and\ dry\ sludge) - wt.(dish)}{wt.(dish\ and\ wet\ sludge) - wt.(dish)}, 100$$

C. *Chemical Oxygen Demand (COD):* It is an inductive measure of the amount of oxygen that can be consumed by the reaction in a specific measured sample.

$$COD = \frac{N(B - A)\ 8000}{V}$$

D. *Dissolved Oxygen (DO):*

The dissolved oxygen concentration of sea water is defined as the number of milliliters of oxygen gas (O_2) per liter of sea water.

E. *Ph:* Ph is a measure of how acidic / basic water is. The range goes from 0 to 14 with 7 being neutral.

III. Summary and discussion

Table 1 consists the sample calculations that are carried out in the following study. The parameters that are considered for pre and post treatment of wastewater are Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Total dissolves solids (TDS), and Dissolved oxygen (DO). The necessary input parameters are put in the standard formula and by using a standard mathematical procedure the results are achieved.

IV. Conclusion

The study concludes that the treated wastewater near the wastewater plants of panchaganga river as well as ganga rivers is suitable for agricultural irrigation but there is a possibly to improve the tertiary level treatment with nanotechnology techniques and phytormediation mechanism so that TD, chloride, TH and all other pollutants can be removed to a greater extent and the water can be further used for domestic purpose also.

TABLE I

DATA OF CALCULATIONS, INPUT PARAMETERS, FORMULAS AND FINAL RESULTS.

Sr No.	Parameters	Input data	Formula	Results
1	BOD	1.DOi=8.8, DO_f =1.9, Bi=9.1,B_f =7.9, F=0.95,P=0.05. 2.DO1=840,DO2=230,	BOD = $\frac{(d1-d2)-(b1-b2)\times f}{p}$	1. 115.2mg/lit 2. 976ppm
2	TDS	Weight of crucible=1.(18.1450grms),2.(21.0256grms) sample volume=1.(25ml),2.(50 ml),weight of crucible and dry solids=18.1482gms),2.(21.030),weight of crucible and ash=1.(18.145gms),2.(21.0263)	Suspended solids = $\frac{\text{wt of dry solids}}{\text{sample volume}} \times 1{,}000{,}000$	1. 128mg/L 2. 90mg/L
3	COD	VB=36, VS=26.2, X=10 V=25ML,A=6.1cm3,B=28cm^3,N=0.1	COD = (VB-VS) N$\times\frac{8000}{X}$	1. 784PPL 2. 707.2mg/dm^2
4	DO	N($S_2O_3^{2-}$) = 0.0500*15.50/100, Ratio is O_2: $S_2O_3^{2-}$1:4, N=1.56×10^-4, V=500/1000. C=0.0200, V=15.20/1000	C = n/v	1. 9.98 ppm 2. 4.67ppm

References

[1] S. S. M. Adbarzi, P. Tripathi, K. K. Choudhary, R. Kant, V. Tripathi, "Assessment of Physico-chemical ptopertied of pre and post-treated waste water of prayangraj region and its effect on nearby Ganges river", *Society of plant research*, 14 Jan 2020. https://doi.org/10.1007/s42535-020-00103-y.

[2] K. R. Mulla and S. M. Bhosle, "Water quality analysis and simulation on Panchaganga river using Matlab *International Journal of Engineering Sciences & Research Technology*, Volume 5, Issue 8, 2016, pp. 613-620.

[3] S. Bidhuri, M. M. A. Khan, "Assessment of ground water quality of central and southeast districts of NCT of Delhi:, Journal Geological Society of India, Vol.95, pp-95-103,Jan 2020. https://doi.org/10.1007/s12594-020-1390-7.

[4] T. Schellenberg, V. Subramanian, G. Ganeshan, D, Tompkins and R. Pradeep, "Wastewater Discharge Standards in the Evolving Context of Urban Sustainability-The Case of India", Frontiers in Environmental Science, Vol-8, Article-30, pp-1-23, April 2020.