

Study of Physico-Chemical Characteristics of Pavana River: Review

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Abstract:*The study was aimed to review the status of physicochemical characteristics of Pavana River, Pune from literature survey. Study of data of water quality has been studied in the month of January 2012. The physicochemical parameters such as pH, DO, COD, BOD, Electrical Conductivity, Alkalinity, Total Dissolved solid, Hardness, Free Carbon dioxide, total Phosphorous as Phosphate has been studied. It was found that at many places the water is highly polluted. There was a less amount of DO and some parameters are beyond the limit in the water. For the statistical analysis, values of mean, standard deviations and correlation were also calculated for the water quality characteristics.*

Keywords: Pavana River, Physico-Chemical, Parameters, literature review, Characteristics.

I. INTRODUCTION

A. General

Water is essential for the survival of all forms of life. Though 80% of earth's surface is covered by water, the fresh water supply has increasingly become a limiting factor because of various reasons. The expansion of industrialization and exploding population are the major ones. Acute short fall of heavy rains, poor water shed management, abundant use of water for household and agricultural purposes have led to the overexploitation of the surface water sources especially from the river bodies. Many perpetual rivers become short-lived and even dried up.

Water quality characteristics of aquatic environments arise from a massive amount of physical, chemical and biological interactions. The water bodies such as rivers, lakes and estuaries are continuously subjected to a dynamic state of change with respect to their geological age and geo chemical characteristics. This dynamic balance in the aquatic ecosystem is upset by human activities results in pollution which in turn manifests dramatically as fish kill, bad taste of drinking water, offensive odors and unchecked growth of aquatic weeds etc. Quality of water is now a great concern for environmentalists as well as the common public in all parts of the world. There are numerous sources of pollutants that could deteriorate the quality of water resources.

The surface water bodies become the dumping source for industrial effluent and domestic wastes. As a result, the naturally existing dynamic equilibrium among the environmental segments get affected leading to the state of polluted rivers. According to World Health Organization's (WHO) decision, water for the consumers should be free from pathogenic organisms and toxic substances. In spite of vast water resources in lakes and rivers and good monsoon, India faces perennial

problems of floods and droughts and high pollution of fresh water resources.

B. Pavana River

It is a fact that good water quality produces healthier humans than one with poor water quality. Pavana River is life line of Pimpri-Chinchwad city and its water is used for domestic and agriculture purposes. Therefore, effective maintenance of water quality is required through appropriate measurements. Physico-chemical and micro-biological characteristics may describe the quality of water. Therefore, this study was carried out for the actual status of Pavana river from literature survey. In addition, with increasing number of industries and stakeholders of the river, the concern over the quality has also grown up and hence warranted for the present investigation.

The Pavana River originates from the Western Ghats, about 6 km South of Lonavala. Flowing eastwards initially, it becomes southbound and passes through the suburbs of Dehu, Chinchwad, Pimpri and Dapodi before its confluence with the Mula river near Sangvi. An earthfill gravity dam forms the Pavana reservoir. The dam, constructed in 1972, is 1,329 m (4,360 ft.) long and 42.37 m (139 ft.) high, with a gross storage capacity of 30,500 km³.

II. LITERATURE REVIEW

A Physico-Chemical monitoring of major rivers in Pune was done during the month of January 2012 by Mane A. V., Pardeshi R. G., Gore V. R., Walave R. L., Manjrekar S. S. and Sutar G. N. In Pune city there are three major rivers named Mula, Mutha and Pavana. For this assessment four sampling points were selected from Kivalegaon to Kalewadiphata of Pavana River and the samples were collected along the course of rivers. The analysis was carried out for the parameters namely pH, DO, BOD, COD, TDS, EC, Alkalinity, Free CO₂, Hardness, Phosphorous as Phosphate. In many places the continuous discharge of industrial effluents and sewage are being discharged into the rivers, which probably exceeds the assimilative capacity of environment, leads to accumulation of pollutants on ground water and soils. The results obtained in this investigations revealed that the discharge of untreated industrial effluents and sewage have contributed considerable pollution in the river Pavana, hence the water of river is unsafe for consumption or human use and needs preventive action.

A major area of interest in studies of stream water quality is the evaluation of trend over time in certain constituent concentrations that can be attributed to human activities. Many causes of water pollution including sewage and fertilizers contain nutrients, (such as nitrites, Sulphate, and phosphates). If added in excess levels, nutrients over stimulate the growth of aquatic plants and algae. Excessive growth of these types of organisms consequently clogs our waterways. Pollution is also caused when silt and other suspended solids, such as soil, wash of plowed, construction and logging sites, urban areas and

eroded riverbanks when it rains. Pollution in the form of organic matter enters waterways in many different ways as sewage, leaves and grass clipping.

When natural bacteria and protozoan in the water break down this organic material, they begin to use up the oxygen dissolved in the water. Many types of fish and bottomdwelling animals cannot survive when dissolved oxygen drops below 4 parts per million. When this occurs, it kills aquatic organisms in large numbers to disruptions in the food chain causing "Eutrophication."

For this study the area is confined to stretch of Pavana River. Pavana River is the one which is more concerned with industrial effluents from small and large scale industries. Besides that,

receives large amount of domestic sewage from municipality sewers and slum areas.

This study is only aimed to know about the Physico-Chemical characteristics of Pavana River, therefore study the Pavana river area in detailed. They studied and analyzed the Pavana River for understanding the quality of water. In Pavana river samples were taken from four places, First one from Kivalegaon, second one from Ravet-Punavale bridge, third one from Chinchwadgaon and fourth one from Kalewadiphata area. The reading obtained from testing is given in table no.-I and graphical comparisons shown in figure no.-I. Values for statistical analysis are also taken with mean values, standard deviation and coefficient of variation are given below.

Table I: Selected locations of Pavana River in January 2012 and their statistical analysis

Parameter (in mg/l)	Pavana				Mean	Median	Std. deviation	Minimum	Maximum	Coefficient of Variation
	Kivalegaon	RavetPunavale Bridge	Chinchwad-gaon	Kalewadiphata						
pH*	8.1	7.9	7.7	7.4	7.8	7.8	0.3	7.4	8.1	3.9
DO	4.8	3.2	5.2	1.6	3.4	4.0	1.7	7.4	5.2	49.0
BOD	33.8	46.2	51.2	35.1	40.9	40.7	8.5	33.8	51.2	20.8
COD	107.0	105.0	114.0	120.0	111.3	110.5	6.9	33.8	120.0	6.2
Hardness	58.0	72.6	86.0	111.2	79.7	79.3	22.6	58.0	111.2	28.4
EC	130.4	164.1	249.3	408.1	216.0	206.7	124.0	58.0	408.1	57.4
Alkalinity	72.00	64.0	118.0	216.0	117.0	130.0	78.3	64.0	216.0	66.9
TDS	65.1	82.1	124.3	195.6	106.8	103.2	58.1	64.0	195.6	54.4
Phosphate	17.9	20.8	7.4	10.5	13.0	14.2	6.3	7.4	20.8	48.1

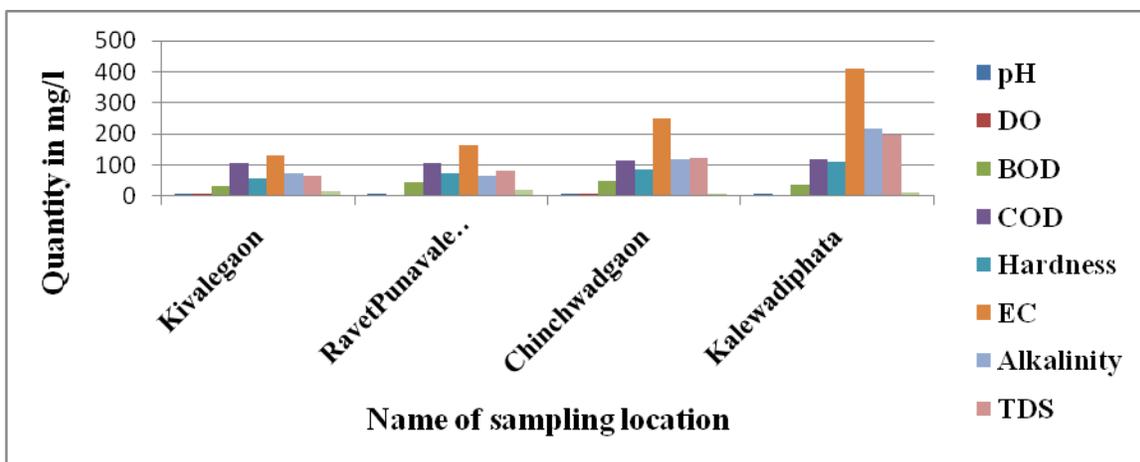


Figure I: Comparison of various parameters of Pavana River in January 2012

III. CONCLUSION

The water samples were collected in the month of January 2012. Samples were testing using the standard procedure in accordance with the standard method of American Public Health Association (1995). The results obtained at the above mentioned sampling stations are given in the observation table. In the present study of literature investigation, an attempt has been made to assess water quality with reference to physicochemical properties, heavy metals, sediment and weed analysis of the riverine area of Pavana. Chinchwad is a major industrial hub and hosts one of the biggest industrial zones in Asia. This town is home to the Indian operations of major automobile companies, several industries, manufacturing units etc. leading to various kinds of pollution. The site Chinchwadgaon and site Kalewadiphata were observed to be polluted because of industries around and their discharges. The site Kalewadiphata was highly polluted in relation with higher free CO₂ and alkalinity as compared to site Chinchwadgaon. Higher values of TDS, EC also indicate more pollution at site Chinchwadgaon. The concentration of heavy metals was also observed to be higher at site Kalewadiphata and site Chinchwadgaon as compared to other two sites (i.e. Kivalegaon and Ravet-Punavale bridge site) indicating pollution of surface, ground water, sediment and weed sample. Lead (Pb) is highly toxic to humans and was also observed to be present in some samples. The parameters DO, COD, BOD, Alkalinity, Total Hardness, Total Phosphorous and Free CO₂ were varying significantly due to different environmental conditions and wastewater receiving sites located at the bank of river. Sediments collected from four different sites also showed higher levels of heavy metals and is the clear indication of contamination. Sources of wastewater from industries and residential areas, washing clothes, cars and dumping of garbage was observed on these sites. It was also observed that the natural quality of water resources is getting deteriorated at faster rate. Ground water of this area showed higher values of hardness content as compared to surface water range (58 to 111.2 mg/l). The higher value of TDS (195.6 mg/l) in one area of water and in other site 65.12 mg/l. COD was observed by

value of 120mg/l at surface water at one site, 33.8 mg/l at other site.

D.O. is the important parameter in assessing water quality and reflects the physical and biological processes, prevailing in the water. Good water should have the solubility of oxygen. Oxygen saturated water have pleasant taste. The DO of Pavana River ranges from 1.6 to 5.2 mg/l. Further studies are needed with an extensive and continuous study for other priority pollutants and monitoring the area of influence. More representative samples should be used to go beyond preliminary assessment as reported in the present study and thereby making appropriate recommendations. At last literature are also recommend that the surface and ground water monitoring should be carried out on planned basis and frequently by respective government departments. Such type of monitoring studies should go beyond nominal water parameters and should have a standard list of parameters as suggested by international agencies like World Health Organization including heavy metals, various group of pesticides and micro pollutants of special importance to ecosystems.

The Pavana river besides domestic sewage; receives enormous amount of industrial wastes with a high Physico-Chemical characteristics, which makes it to be another polluted river next to Mutha river. According to review of literature paper from 2012, it is also observed that there is need to analyze the present status of Pavana river with respect to present condition of population, industrial development and pollution by the same.

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REFERENCES

- i. *Research Journal of Animal, Veterinary and Fishery Sciences Vol. 1(1), 11-16, February (2013) Res. J. Animal, Veterinary & Fishery Sci. The Seasonal Fluctuation of Physico-Chemical*

parameters of River Mula- Mutha at Pune, India and their Impact on Fish Biodiversity ChandanshiveNavnathEknath Zoology Department, Fergusson College, Pune, MS, INDIA

ii. *International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 2, Issue 9, September 2013 Copyright to IJIRSET www.ijirset.com 4349 physico-chemical characteristics of river water of ganga in middle ganga plains Dr. LeenaSingh& Prof. (Dr.) S.K Choudhary Assistant Professor, Department of Chemistry, Galgotias College of Engineering, & Technology, Greater Noida, U.P, India Department of Botany T.M. Bhagalpur University, Bhagalpur, Bihar, India.*

iii. *Physico-chemical assessment of water quality of river Chambal in Kota city area of Rajasthan state (India) Nitin Gupta, S.M.Nafees, M.K.Jain and S. Kalpana Environmental Chemistry Laboratory, P.G. Department of Chemistry, Govt. College, Kota, Rajasthan.*

iv. *Qualitative analysis of surface water of Panchganga river (MS), India Sanindhar Shreedhar Gaikwad and Nitin Anandrao Kamble Department of Zoology, Shivaji University, Kolhapur- 416 004, (MS) India.*

v. *PHYSICO-CHEMICAL ANALYSIS OF MULA MUTHA RIVER PUNE Pali Sahu I, Sonali Karad, Sagar Chavan and Sourabh Khandelwal Asst. Prof. Environmental Engineering, Civil Department, VIIT, Pune, India U.G. Student, Civil Department, VIIT, Pune, India.*

vi. *Dr. Roohollah Behzad Department of Environmental Science, University of Pune Dr. Ravindra G. Jaynhaye Professor of the Department of Geography, University of Pune Dr. Praveen G. Saptarshi Retired Professor of the Department of Environmental, University of Pune Assessment of Water Quality in Manas Lake (Pune-India) With Reference to the Human Impact.*

vii. *Hydrobiological Study of Algae of an Urban Freshwater River JAFARI, N G; GUNALE, V R Department of Environmental*

Sciences, University of Pune, India. Department of Botany, University of Pune, India.

viii. *Water quality and sediment analysis at selected locations of Pavana river of Pune district, Maharashtra Mane A. V., Pardeshi R. G., Gore V. R., Walave R. L., Manjrekar S. S. and Sutar G. N. Department of Environmental Sciences, Fergusson College, Pune Fergusson College, Pune Department of Chemistry, Fergusson College, Pune. (Journal of Chemical and Pharmaceutical Research, 2013, 5(8):91-102 Research Article ISSN : 0975-7384 CODEN(USA) : JCPRC5)*

ix. *Comparative Comparative Comparative Comparative Review of Physico-chemical Assessment of Pavana River River Nidhi Jain, 2R.K. Shrivastava Department of Science and Humanity, Genba-Sopanrao Moze Institute of Technology, Pune University, India P.G. Department of Environmental Science, Government Model Science College, Center of Excellence (NAAC Accredited 'A' Grade, Jabalpur (M.P.), India. (IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402, p- ISSN: 2319-2399. Volume 8, Issue 6 Ver. III (Jun. 2014), PP 25-30).*

x. *D.G.Kanase, S.D.Jadhav, R.W.Jawale, M.S.Kadam, A study on some physicochemical characteristics of flowing water of Major River in Pune city.*

xi. *Patil. P.N, Sawant. D.V, Deshmukh. R.N " Physico-chemical parameters for testing of water – A review" International Journal of Environmental Sciences Volume 3, No 3, 2012*

xii. *Inderdeep Kaur and Deen Dayal Verma, "Physicochemical and Microbiological Study of River Water of Ganga and Yamuna in Allahabad" Asian Journal of Science and Technology ISSN: 0976-3376 Vol. 5, Issue 11, pp.669-673, November, 2014*

xiii. *Manohar G. Gavit, Mohd. Shahnawaz, Manish K. Sangale, Halimabi A. Kureshi and Avinash Bade, (2013), International Journal of Current Research 5(02), Page 232-235.*

xiv. *APHA 2012 EDITION.*