Poll Res. 41 (3) : 1112-1115 (2022)

ISSN 0257–8050
DOI No.: http://doi.org/10.53550/PR.2022.v41i03.049

ANALYSIS OF MULA - MUTHA RIVER WATER FOR ITS PHYSICO-CHEMICAL CHARACTERISTICS, PUNE, (INDIA)

S.D. JADHAV*[1], S.S. MOHITE[2] AND M.S. JADHAV[3]

[1]Department of Basic Sciences & Humanities, Bharati Vidyapeeth (Deemed To Be University) College of Engineering, Pune, Maharashtra, India
[2]Chemistry Department, Bharati Vidyapeeth (Deemed To Be University) Y. M. College, Pune, Maharashtra, India
[3]Department of Civil Engineering, Sinhgad Technical Education Society's Sou. Venutai Chavan Polytechnic, Pune, M.S., India

(Received 8 February, 2022; Accepted 28 March, 2022)

ABSTRACT

Water pollution is one of the most important problems nowadays. The entire world is facing this problem. Due to this problem, the living organism are affected everywhere. Industrial effluents, agricultural run-off, domestic sewage are some of the sources of water pollution. Various types of pollutants are discharged in to the river body continuously. Shortage of clean drinking water and increased demand due to rapid development of industrialization, the river water is becoming a burning issue everywhere. Here, Mula-Mutha River was analyzed for its physico-chemical parameters in the year 2021. It is observed that, BOD, COD, chloride and magnesium are observed beyond the limit.

KEY WORDS: Mula-Mutha River, Industrial effluents, Agricultural run-off, etc.

INTRODUCTION

We have seen various forms of water, like surface water, underground water, lake water and sea water. River water is one of the best examples of surface water. This is one of the important resources for all kind of life near and on the bank of river (ICMR, 1975). Generally, in the rural India, river water is the major source of water, all are dependent on this. But in case of urban area, rivers are mainly used as a dumping ground to throw the unwanted materials in the river body. Also, some of the rivers are used to release the untreated sewage water in to the river body. This particular exercise is very harmful to community people as well as aquatic life also (Lind,. 1974 and Mahananda, *et al*., 2005)

Depending upon the area, means in case of rural area major water polluting parameters are like agricultural run-off, the river water is used for various activities like bathing, washing clothes, utensils, animals and vehicles (Mahananda *et al.*, 2005). Due to all these activities river water get deteriorate, hence, the actual chemistry of river water get changed. On the other hand, in case of urban area, major role of water pollution is carried by municipalities or corporation (Kataria, *et al*., 1995 and Lind, O. T. 1974). They send the untreated sewage water in to the water body (Mahananda *et al.*, 2005). From ancient times we have seen that community people as well as industrialization take place on the bank of river, to fulfill their daily need. But this is the initial stage from where deterioration of water body starts.

Mutha river originates near Temghar Dam, it flows through city of Pune. This river arises in Western Ghats and flows in east side. Mula river originates from Mulshi Dam, and it flows through Pimpri Chinchwad Muncipal Corporation area of Pune city. At Shivajinagar area both Mula and Mutha meets and then flows as Mula-Mutha river through Pune city.

METHODOLOGY

Materials and Methods

For this river water analysis seven sampling stations were selected. While selecting the sampling stations care was taken that, maximum population density and load should be covered. The samples were collected in one litre polythene bags. The bags were washed thoroughly and rinsed by distilled water before the collection of samples. After the collection of water samples, samples were kept in a laboratory by taking precautions given by Trivedy and Goel (1987) and APHA (1995). For this water analysis standard methods were followed given by (APHA 1995; Trivedy and Goel, 1987).

Selected Sampling Stations

Table 1.

Sr. No.	Name of Sampling Station
1	Khadakwasla
2	Warje Bridge
3	Mhatre Bridge
4	Z -Bridge
5	Sangam Bridge
6	Bund Garden
7	Holkar Bridge
8	Koregaon Park/kalyaninagar
9	Mundhwa Bridge

Status of Mula-Mutha River

RESULTS AND DISCUSSION

River water was analyzed for the various physico-chemical parameters. The study was done in the year 2021. The observed river water quality

Fig. 1. Mula – Mutha river near Pune Corporation

Fig. 2. Mula – Mutha river Holkar Bridge

parameters are shown in the observation table. pH is nothing but potential of hydrogen. As per the definition pH is a measure of the concentration of hydrogen ions. The amount of hydrogen ions shows the acidity or alkalinity of the water body (Sawane *et al.*, 2004; Sawant, *et al.*, 2011). Here, highest pH value was recorded, i.e. 7.2 at Sampling station No. 2. We are well known that naturally occurring fresh waters have a pH range between 6.5 to 8.5. pH of water is very useful as it affects the solubility and availability of nutrients. With the help of a pH value we can get an idea of water pollution level. Similar findings

Table 2.
Observation table

Parameters	Sampling Station No. 1	Sampling Station No. 2	Sampling Station No. 3	Sampling Station No. 4	Sampling Station No. 5	Sampling Station No. 6	Sampling Station No. 7	Sampling Station No. 8	Indian Stan-dards
pH	6.9	7.2	6.72	6.32	5.84	6.33	6.21	6.30	6.5-8.5
DO	4.8	4.6	4.9	4.3	3.8	3.2	2.4	2.6	7.6-7.0
BOD	9.8	12.8	139.	127	159	168	160	162	30
COD	14.02	288	380	292	378	384	406	398	250
Chloride	53	161	232	244	283	291	310	308	250
Nitrate	19	17	21	26	29	36	32	37	45
Sulphate	16	21	18	16	19	27	23	28	200
Calcium	23	21	26	27	30	42	46	43	75
Magnesium	18	16	19	22	21	36	39	42	30
Hardness	27	68	109	128	133	148	157	162	300

Fig. 3. Mula – Mutha River at Kalyaninagar area

Fig. 4. Washing Vehicles in Mula – Mutha River

were noted by Pawan Kumar Singh, 2015 and Jadhav *et al.*, 2021 (Sawant *et al.*, 2011).

Generally, in the monsoon season, DO level is increased, while at the pre- monsoon this DO level is having low level. There are many reasons but one of them may be addition of more water due to rain (Samantray *et al.*, 2009; Sinha, 2010). Here, the observed values are in the range of 2.4 to 4.8 mg/l. When the temperature increases, the DO level decreases it may be due to increased microbial activity (Radhakrishnan, *et al.*, 2007). BOD and COD are the measure of organic material contamination water. Here, for both of these parameters, DO level is important. As, BOD is nothing but the amount of dissolved oxygen required for chemical oxidation of the organic material. Both of these parameters are pollution level deciding factors of the water body (Tiwari, 2004, Upadhyay, *et al.*, 1991).

Chloride concentration was observed in the range of 53 to 310 mg/l. Desirable limit of chloride in the water body is 250 mg/l as per WHO. Here, observed value is beyond the limit. More chloride concentration means more pollution; it may be due to mixing of higher organic waste of animal origin (Sawane *et al.*, 2004, Sawant, 2011). And a natural process likes passage of water through natural salt formations. In case of nitrate level, now –a –day's nitrogen fertilizers are widely used in agricultural area and due to this organic nitrogen are observed in various waste products (Patil, 2013 and Pawan Kumar Singh, 2015). Also, sewage water, effluents, animal excrement, manure and municipal wastes like factors are responsible for nitrogen. Here, observed concentration is in the range of 17 to 37 mg/l. Minor amount i.e. 2 mg/l of sulphate content is observed in the atmosphere precipitation. But due to normal reactions like reduction, precipitation and concentration a wide range of sulphate is observed. The sulphate content in the samples varies between 16 to 28 mg/l. Which is below the desirable limit given by WHO. Calcium concentrations were found to be varying from 21 to 46 mg/l. The observed values are within the permissible limit given by Indian standards. Magnesium concentrations were observed in the range from 16 to 42 mg/l, which is beyond the permissible limit of WHO. Calcium and magnesium together cause the hardness of water (Vaishali, *et al.*, 2005). As per Indian standards hardness is desirable up to 300 mg/l. here observed vales are within the limit.

CONCLUSION

By studying the Mula-Mutha river water for its physico-chemical analysis, it is observed that, at the origin point the river water is most suitable for all the purposes. While flowing through the city of Pune, various impurities in the form of sewage water and industrial effluents are getting mixed in to the river water. Hence, the river water is not suitable after first sampling station.

ACKNOWLEDGEMENT

Authors are very much thankful to Hon' Dr. Shivajirao Kadam Sir, Dr. K D Jadhav Sir and university authorities for the constant help and support for this work.

REFERENCES

APHA, 1955. *Standard Methods For The Examination Of Water And Waste Water*. 19th Edition, *American Public Health Association, American Water Work*

Association and Water Pollution Contl. Federation, Washington, D.C. NewYork.

BIS, 1991. Indian Standards for Drinking Water, Bureau of Indian Standards, New Delhi, IS: 10500.

ICMR, 1975. Manual of standards of quality for drinking water supplies. Indian Council of Medical Research. Report No- (1975) 44: 27.

Jadhav, S. D. and Jadhav, M.S. 2021. Evaluation of ground water quality with special reference to sulphate concentration of rural area near Karad City, (Satara) Maharashtra. *Ecology, Environment and Conservation.* 27 Suppl. Issue, (S174-S177)

Jadhav, S.D. and Jadhav, M.S. 2013. Study of chloride and nitrate concentration of Mula Mutha River in Pune city (Maharashtra) *Int. J Chem Life Sci.* 2(3): 1140-1142.

Kataria, H.C., Iqubal, S.A. and Sandilya, A.K. 1995. Limnochemical studies of Tawa Reservoir. *Indian J. of Envtl. Prtcn*. 16(11): 841-846.

Lind, O. T. 1974. *Handbook of Common Methods in Limnology*. The C.V. Mosby Company, Saint Louis (USA).

Mahananda, H.B., Mahananda, M.R. and Mohanty, B.P. 2005.Studies on the Physico-chemical and Biological Parameters of a Fresh Water Pond Ecosystem as an Indicator of Water Pollution. *Ecol. Environ. Conserv.* 11(3-4): 537-541.

Patil, S. R., Sawant, R. S., Patil, S.S., Sathe, T.V. and Patil, R.S. 2013. Avian fauna and Physico-chemical parameters of Gajargaon Pond of Ajara Tahsil, Kolhapur (M. S.). *Rasayan Journal of Chemistry.* 6 (1): 76-79.

Pawan Kumar Singh and Pradeep Shrivastava, 2015. Analysis of water quality of river narmada", *International Journal of Current Research.* 7(12): 24073-24076.

Radhakrishnan, R., Dharmaraj, K. and Kumari, R. 2007. A comparative study on the physico-chemical and bacterial analysis of drinking,borewell and sewage water in the three different places of Sivakasi. *Journal of Environmental Biology.* 28(1): 105-108.

Sawane, A.P., Puranik, P.G. and Bhate AM. 2004. Assessment of water quality of river Irai (District Chandrapur) on the basis of seasonal fluctuations in dissolved oxygen and biochemical oxygen demand. *J Ecophysiol OccupHlth*. 4: 17-21.

Sawant, R.S., Desai, P.D. and Desai, J.S. 2011. Physico-chemical properties of the Uttur tank in Ajara tahsil, Maharashtra. *J. Ecobiol*. 29(3): 205-211.

Samantray, P., Mishra, B. and Rout, S.P. 2009. Assessment of Water Quality Index in Mahanadi and Atharabanki Rivers and Taldanda Canal in Paradip Area, India. *J Hum Ecol.* 26(3): 153-161.

Singh, M.R., Gupta, A. and Beetteswari, K.H. 1995. Physicochemical properties of samples from Manipur River system, India. *J. Applied Science of Environmental Management*: 14(04): 85-89.

Sinha, S.K. 2010. Potability of some rural ponds water at Muzaffarpur (Bihar), A note on water quality. *Pollution Research*. 14(1): 135-140.

Sharma, M.L. 1996. Impact of agriculture on nutrient contamination of water resources. In: Singh VP, Kumar, B. (eds) *Water Quality Hydrology*, Kluwer Academic, Dordrecht, 57-79.

Singh, K.P., Malik, A., Mohan, D. and Sinha, S. 2004. Multivariate statistical techniques for the evaluation of spatial and temporal variations in water quality of Gomti River (India)–a case study. *Water Research*. 38: 3980-399.

Tiwari, D. 2004. Pollution Potential of the Wastes Polluting River Pandu, *Nature Environmental Pollution Technology*. 3: 219-221.

Trivedy, R.K and Goel, P.K. 1987. *Chemical and Biological Methods for Water Pollution Studies*. Environmental Publications, Karad, India.

Upadhyay, R.K. and Rana, K.S. 1991. Pollutional status of river Yamuna at Mathura. *Nat. Enviro*. 8: 33-37.

Vaishali, W., Aher, H.R. and Kuchekar, S.R 2005. Determination of physico-chemical characteristics of sewage water from Loni village. *Indian Journal Environ and Ecoplan*. 10(2): 419-421.

WHO, *Guidelines for Drinking Water Quality*. 2nd edition. Recommendation. World Health organization Geneva. 1: 30-113.