

# Water Quality Assessment of Police Pond near Katol Road Square, Nagpur, Maharashtra, India

A.M. Watkar<sup>1</sup> and M.P. Barbate<sup>2</sup>

<sup>1</sup>Bhalerao Science College, Saoner Dist. Nagpur- 441107

<sup>2</sup>Head of Dept. Bhalerao Science College, Saoner Dist. Nagpur- 441107

E-mail: <sup>1</sup>amitawatkar2@gmail.com, <sup>2</sup>milindbarbate@gmail.com

---

**Abstract**—Water is an important part of our life. In recent years importance of water for human health, hygiene and production of food has become widely recognized. The police pond is one of the major reservoirs located in Police area near Katol road square in Nagpur. It is situated around 21° 9' 0" North latitude and 79° 6' 0" East longitude at an altitude of 310.33 m. Water samples were collected monthly from the study area of pond from January 2013 to December 2013 and were analysed in the laboratory for different properties such as water Temperature, pH, turbidity, conductivity, alkalinity, DO, BOD, COD, phosphate, sulphate, nitrate etc. Glimpse of observations on physico-chemical parameters indicate that the pond at the sampling site is polluted.

**Keywords:** Physicochemical, police pond, water, pollution.

## 1. INTRODUCTION

Water supports life on earth and around which the entire fabric of life woven. It is well established fact that life, doubtless originated in water and therefore like air, water is one of the most important and precious natural resources and a regular and plentiful supply of clean water is essential for the survival and health of all living organisms. A huge quantity of fresh water is available on our planet; almost 1500 million cu kms. However, 70% of available water is of no use as it contains significant quantity of salt. Total amount of available fresh water on our planet is only about 84.4 cu. kms of which 70% water is in frozen state in the form of snow caps, ice sheets, glaciers etc. Thus less than 1% of total water remains for human use and that too which is unusually distributed all around the earth. This constant amount of water passes through a system of hydro biological cycle.

A water body affects the environment in its vicinity, like charging of ground water tables, conditions of climate etc. Most of the people like washer man, and fisherman, living in the surrounding area depend on this source of water for their survival. Any damages to this water source by any agency will not only make life miserable but that will also disrupt the aquatic ecosystem. It is therefore necessary to study the quality of river water, on the basis of physico-chemical parameters so as to assess its potability. Most of our water

bodies, rivers and streams have become polluted and unfit for human use. In 1970 about 3500 cu kms. of water were diverted for human use, while about 5800 cu kms. of clean water were found to be polluted with varying degree of pollution (Rogers, 1991).

The physico-chemical characteristics of an aquatic body do not only reflect the type and diversity of aquatic biota but also the water quality and pollution status. The present study includes physico-chemical and biological characteristics and their seasonal variation for a period of one year (rainy, winter and summer) Jan 2013 to Dec 2013 at police pond near Katol road square, at aforesaid site was analysed for temperature, pH, acidity, alkalinity, DO, BOD, COD, chloride, nitrate, and phosphate.

## 2. MATERIAL AND METHODS

A work plan has been conceived to study the physico-chemical and biological status of Police pond near Katol road square, Nagpur. The proposed work dealt with the study of pond in the vicinity of Nagpur. Water samples were collected weekly in clear glass bottles from surface (max. depth 20 cm) and vegetated zone of five different sites of the river. Water samples were collected in three replicates from surface, column and bottom of the site and mean values of all three observations were taken into consideration. For BOD estimation, water samples were collected separately in dark bottles. The acquisition of meaningful data demands correct sampling and storage procedures. It has been scientifically proved that the shorter the time interval between sample collection and analysis, more the accurate are the results. The preservation of samples were done by refrigeration at 4°C, which is most general accepted method. Water and air temperature were recorded with a digital centigrade thermometer on the date of sampling.

Physico-chemical parameters like water temperature, pH, DO, free Carbon-di-oxide, total alkalinity and conductivity were

measured in the field. Other parameters were mostly tested within 24 hrs of collection.

A total of 12 limnological parameters of water viz., temperature, turbidity, pH, DO, BOD, COD, Free CO<sub>2</sub>, total alkalinity, conductivity, TDS, Phosphates, nitrate were determined. All the parameters were analysed following the standard methods (Golterman, 1969; Michael, 1984; Trivedi & Goel, 1984; APHA, 1989) and by spectrophotometer SQ 118. Pearson's correlation coefficients were calculated for the determination of relationships between different types of physico-chemical parameters.

### 3. OBSERVATION:

As shown in Table 1 For Month wise physicochemical properties of water samples. Of police pond (Jan.2013 to Dec. 2013).

**Table 1: Physico-chemical parameters of Police pond**

Sr. No.	Parameter	Monsoon	Winter Season	Summer Season	Mean S.D.
1.	Temperature(°c)	25.3	18.2	29.3	24.2, 5.62
2.	Transparency(cm)	96	108	78	94, 15.09
3.	T.D.S.(mg/l)	278	185	316	259.6, 67.39
4.	pH	7.8	8.5	7.6	7.9, 0.472
5.	Total Alkalinity(mg/l)	132	159	191	160.6, 29.53
6.	Hardness(mg/l)	256	197	133	195.3, 61.51
7.	D. O. (mg/l)	7.9	10.1	6.9	8.3, 1.63
8.	B.O.D.(mg/l)	13.6	25	11.9	16.8, 7.12
9.	Nitrates(mg/l)	0.023	0.019	0.028	0.023, 4.50
10.	Phosphates(mg/l)	0.053	0.045	0.077	0.058, 1.66
11.	C.O.D.	128.1	158.9	82.6	123.2, 38.38
12.	Sulphate	15.1	10.9	19.80	15.26, 4.45

### 4. RESULT AND DISCUSSION:

To assess the quality of pond, Indian drinking water quality standard IS 10500 (1990) has been adopted. The data harvested during the present study is given in table 1. The present data showed the seasonal variations of all the parameters during the study period.

The water temperature is one of the important parameter in pond. In the present study, difference in the fluctuation of water temperature was maximum 29.3°C to 18.2°C. The maximum temperature of the pond was recorded and minimum. Similar results were found by (Shiddamallaya et al. 2008) in Bhalki tank, Bidar.

Transparency is light penetration capacity of the water. The color of water is due to concentration of suspended organic and inorganic particles. Transparency varied from maximum 108 cm to 78 cm. The less transparency observed during summer season. While during winter comparatively the water showed more transparency (Vijayvergia, 2007).

Total dissolved solids include salt and variety of organic substances, which readily dissolve in water and often impart a degree of hardness. The value of total dissolved solids ranged between maximum 316 mg/ltr to minimum 185 mg/ltr. The maximum TDS is observed in summer and minimum value in winter season (Sakhare 2005).

Hydrogen ion concentration is considered as a important ecological factor, which is a result of interaction of various substances in water and in numerous biological phenomenon. According to Hutchinson (1957) nearly neutral pH of water is regulated by carbon dioxide and bicarbonates. The PH was maximum in winter and minimum in monsoon season. pH of pond water ranges between 7.6 to 8.5.

Total alkalinity of water is mainly due to cations of Calcium, magnesium, Sodium and Potassium. It is also due to combined carbonate or bicarbonate or occasionally hydroxides. Seasonal analysis of the pond water showed the higher alkalinity during the summer seasons and lower during monsoon. Chandrasekhar (1996) in Saroornagar lake A.P., reported minimum total alkalinity during monsoon and maximum during summer.

Total hardness in pond water ranges from 133mg/l to 256mg/l. During the monsoon season the higher values of hardness were observed and lower values during summer season. Saha et al. (2001) and Sisodiya et al (2007) have recorded the similar findings.

Dissolved oxygen is also one of the important factors of water quality, which influences the biota present inside the pond water. DO observed in the present study, were maximum during winter while minimum during summer (Bharali et al 2008).

Biological oxygen Demand is a direct measure of O<sub>2</sub> requirement and indirect measure of biodegradable organic matter. The maximum B.O.D. was 25mg/l in winter and minimum 11.9mg/l in summer. Similar findings were observed by Vasumati Reddy et al (2009).

Chemical Oxygen Demand indicates the extent of chemical pollution mainly from human activities. The C.O.D. values observed maximum in winter and minimum in summer season. Similar findings were observed by Singh and Roy (1995).

In the present study, nitrate values ranged between 0.028 to 0.019 mg/l maximum of nitrate values were reported during summer season and minimum during winter. Ujjainia et al (2007) recorded minimum nitrates during the winter season in Mahi Bajaj Sagar pond and maximum during summer in Surwania dam, Rajasthan.

Phosphate concentration in pond water ranged between 0.077mg/l to 0.045mg/l. more concentration of phosphates recorded during the summer while minimum in winter season. Similar results were also reported by Shrishail et al (2008) in Khaji Kotnoor reservoir, Gulbarga.

Sulphate is produced by biological oxidation of sulphur content of organic matter. The sulphate value ranges between 19.80mg/l to 10.9mg/l. According to Angadi et al., (2005) minimum concentration of sulphate was in winter and maximum in summer.

## 5. CONCLUSION

After observing the physic-chemical properties, the pond water is going to become eutrophic in nature leading environmental degradation. It needs long term plan for reversal or eutrophication and pollution control which can improve water quality and make the pond suitable for recreation aquaculture purposes.

## REFERENCES

- [1] Roger, S.P. (1991) Fresh water. In the global possible: resource, development and new century. Repetto. R., Aff. EW. Press, New Delhi.
- [2] Golterman, H.L.(Ed). (1969) Methods of chemical analysis of freshwaters. IBP Handbook No. 8, Blackwell, Oxford.
- [3] Michael, P. (1984) Ecological methods for field and laboratory investigations. Tata-McGraw Hill Pub. Com. Ltd., New Delhi. 404p.
- [4] Trivedy,R.K., Goel, P.K., Shrotri, A.C., Khatavkar, S.D. (1984) Prospective in Aquaculture. Biol., pp-15-18.
- [5] APHA (1989) Standard methods for the examination of water and wastewater. 17<sup>th</sup> edition, American Public Health Association, Washington, D.C.
- [6] Shiddamallayya, N. and M. Pratima (2008). Impact of domestic sewage on fresh water body. J. Environ. Biol. Vol. **29**(3): 303-308pp.
- [7] Vijayvergia, R.P.(2007). Composition and periodicity of Cyanophyceae in eutrophic lake, Udaisagar, Udaipur, NSL-2007, 326-328pp.
- [8] Sakhare, V.B. (2006). Ecology of Jawalgaon reservoir in Solapur district, Maharashtra, Ecology of lakes and reservoirs, Daya publishing house, Delhi; 16-35pp.
- [9] Hutchinson, G.E. (1957) A treatise on limnology vol. II John Wiley and Sons, New York, 1015.
- [10] Chandrashekhar, S.V.A. (1996) Ecological studies on Saroornagar Lake, Hyderabad. Ph.D. Thesis submitted to Osmania University, Hyderabad. (Dr. Kodarkar M.S.)
- [11] Saha, T., Manna, N.K., Majumdar, S.S. and Bhattacharya, I.N. (2001). Primary productivity of the Subhas Sarobar lake in East Kolkata in relation to some selected physico-chemical parameters, Poll.Res. vol. **20**(1): 47-52pp.
- [12] Sisodia, S., Singh, S., Padmakar, C., Mogali, J.N. and Yadava, R.N. (2007). Seasonal variation and species diversity of macrozoobenthic communities of a tropical lake, Bhopal, NSL: 211-214pp.
- [13] Bharali, J., Baruah, B.K. and Sharma, H.P. (2008). Studies on physico-chemical characteristics of water of the wetlands in Kaziranga National Park, Assam, J.Poll.Res. **27**(4) : 729-733pp.
- [14] K. Vasumathi Reddy, K. Laxmiprasad, M. Swamy, and T. Ravinder Reddy (2009). J.Aqua.Biol, **24**(1), 1
- [15] Singh, J.P. and Roy, S.P. (1995) Limnobiological investigation of Karwarlake, Begusarai, Bihar. Env.Eco.13:pp 330-335.
- [15] Shrishail, V.G. and Pratima, M. (2008). Distribution and periodicity of phytoplankton in Khaji Kotnoor reservoir of Gulbarga region, Karnataka, India J. Ecol. Env. & Cons. **14**(2-3): 429-433pp.
- [16] Angadi, S.B., Shiddamallayya, N. and Patil, P.C. (2005) Limnological studies of Papanash pond, Bidar, Karnataka, J. Env. Biol. 26(2): pp 213-216.