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Testing and Analysis of Pond Water in Abhanpur Tehsil of Chhattisgarh, India

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Abstract: ***Ponds are the essential constituent for living being from the ancient time. It not only maintains water table and temperature but also fulfills the drinking, domestic and agricultural requirement of the population. The chemical, physical and biological characteristics of water with respect to its suitability describe its quality. The objectives behind the study were to develop an overall picture of the pond water quality of Abhanpur (Raipur), and its nearby region for different purposes, and identify possible contamination causes.***

Keywords: Abhanpur, water quality parameters, analysis, WHO, pH, hardness

1. Introduction

Abhanpur is an important tehsil area of Raipur the capital of Chhattisgarh, slowly moving towards urbanization. The population of the area mainly relies upon ground water for domestic and agricultural use but the growing agricultural and domestic necessities of the population and climatic changes pulls our interest towards alternative sources of water available in this region. Since during the past few years extreme weather condition led to the increased scarcity of availability of water (1, 2). Therefore analysis of quality of surface pond water is reasonably essential so that it can serve as secondary source of water in the upcoming future.

The surface water quality in a region largely depends on the nature and extent of the industrial, agricultural, and other anthropogenic activities in the area. Compared to flowing river, pond is more prone towards the pollution due to stagnant water bodies. There are various source of contamination to these ponds. The water of the ponds, lakes and river are polluted mainly due to discharged waste water from residential areas, sewage outlets, solid wastes, detergents, automobile oil wastes, fishing facilities and agricultural pesticides from farm lands (3).

This article presents examination of different physicochemical parameters viz. pH, turbidity, alkalinity, hardness, chemical oxygen demand (COD), total dissolved solid (TDS), Chloride and phospphorus content of pond water from eleven. different Ponds ofAbhanpur, Raipur (C. G.) region.

2. Geographical Location

The geographical position of our study area Abhanpur lies between latitude 21.054 and longitude 81.747. We have selected eleven different ponds of Abhanpur given in Table 1.

3. Materials and Method

3.1 Sample Collection:

All the samples were collected during pre - monsoon (May - June) from eleven different ponds of Abhanpur and nearby region listed in table 1. Water sample collected from different sites in 250 ml plastic bottles, labeled, sealed and stored safely in the refrigerator.

3.2 Water Quality Parameters:

The samples were tested for various physical and chemical quality parameters such as turbidity, pH, alkalinity, acidity, COD, temporary, total and permanent hardness, total dissolved solid, chloride content and phosphorus content. All the Parameters were determined using standard methods described in APHA (American Public Health Association) and the results were compared with WHO (World Health Organization) (4) standards. Freshly prepared distilled water was used for preparing the standards used during the experiment. Abrone digital pH meter was used for determining pH of water samples. Digital turbidity meter was used to determine the turbidity. Alkalinity, acidity and hardness were determined by titrimetric method. COD was determined by closed reflux method. TDS was determined gravimetrically. Phosphorus was determined by spectrophotometer.

4. Result and Discussion

The results of various experiments are shown in Table 1.

Table 1: Water quality parameters of different ponds of Abhanpur region

S. N.	Pond	pH	Alkalinity mg/L	TDS mg/L	Total hardness mg/L	Chloride Content, mg/L	Turbidity NTU	COD mg/L	Phosphorus Content, mg/L
1.	Rakhi	6.23	-	600	21.4	109.2	6	16	0.7
2.	Navataria	6.1	-	610	19	307.7	5	24	0.5
3.	Gatapar	7.4	5	640	20.5	64.5	8	84.8	0.6
4.	ChhotaTalab	6.34	-	800	22	88.3	7	1.6	0.8
5.	Belar Pond	6.6	-	680	24	70.5	4	30.4	0.5
6.	Manikchouri	6.11	-	1360	18	129	8	40	0.9

7.	NayakBandha	6.20	-	625	20.1	109.1	6	32	0.4
8.	Bhelwadih	6.15	-	660	21	112.6	7	24	0.3
9.	Kayabandha	6.12	-	1100	28	42.6	9	16	0.7
10.	Mura (BadaTalab)	6.25	-	650	30.2	94.3	7	40	0.5
11.	Birejhar	6.23	-	800	35.	159.7	8	32	0.6

Table 2: WHO standard for various water quality parameters

WHO Standard	pH	Alkalinity	TDS mg/L	Total hardness mg/L	Chloride Content, mg/L	Turbidity NTU	COD	Phosphorus Content
	6.5 - 8.5	200	300 - 600	200	400	1 - 5	120	-

4.1 pH measurement

The pH varied from 6 to 7.4 during May - June. The *Gatapar* pond has shown maximum pH 7.4 while *Belar* pond has shown minimum 6 pH value. Water with low pH value is harmful for health and can corrode the metallic vessels resulting into increase in the presence of heavy metals in the drinking water (5).

4.2 Alkalinity: All the samples have found nil in alkalinity parameter.

4.3 Turbidity: Turbidity is the optical characteristic of water arises due to interference of suspended water particle with light. The different water sample has shown turbidity varying from 2 to 6.

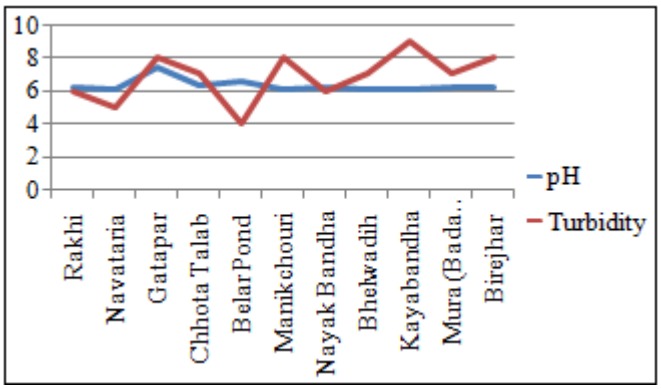

Figure 1: pH and Turbidity profile of different water samples

4.4. Total Dissolved Solid (TDS): Dissolved solid in water refer to inorganic salt mainly calcium, magnesium, potassium, sodium bicarbonates, chloride and sulphates and small amount of organic matter. The TDS of water sample collected from Abhanpur region varied from 600 to 1360 ppm.

4.5. Chloride content: Chlorine combines with inorganic and organic materials present in water to form chloride salts and chlorinated organic chemicals respectively. High chloride content increases the electrical conductivity of water which increases its corrosivity (6). The chloride content of water sample collected from Abhanpur region varied from 42.6 mg/l to 307.7 mg/l.

4.6. Chemical Oxygen Demand (COD): This indicates the amount of oxygen consumed by reaction in a measured solution, indicating about the amount of oxidizable pollutants present in water. The COD of water different sample analyzed found in the range of 64.5 to 307.7 mg/l.

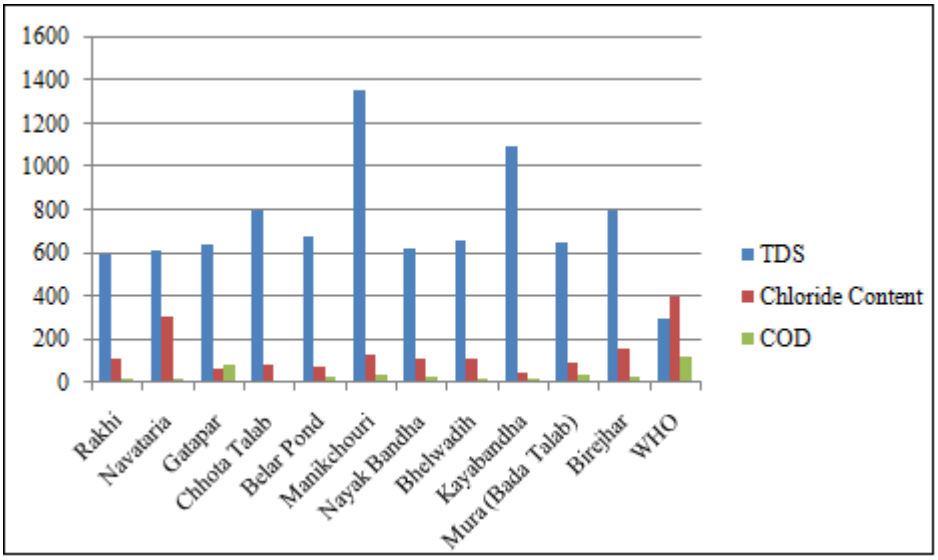

Figure 1: Profile of TDS, Chloride Content and COD of different water samples

4.7. Total Hardness: Total hardness is the indication of the quantity of inorganic salts of multivalent cations present in water (7). The hardness of various water samples varied from 19 mg/l to 32 mg/l.

4.8. Phosphorus: Phosphorus in mainly present in the form of phosphate (PO_4^{-3}) (8). It is an essential nutrient for the growth of plant and animal. Although it is an essential element for plant growth but the excess amount of it leads to problem such as eutrophication (9)

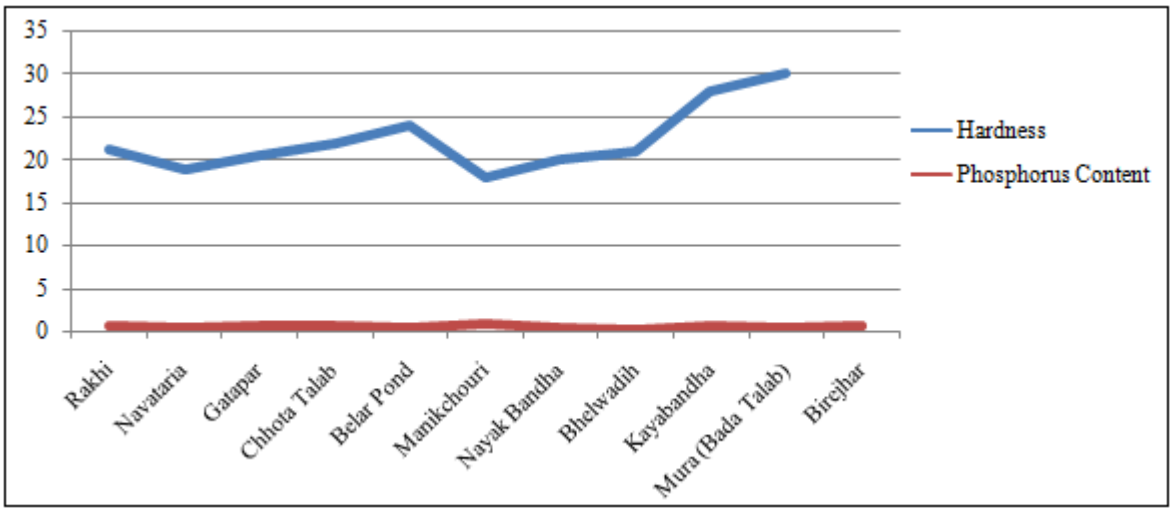

Figure 1: Profile of Total hardness and Phosphorus Content of different water samples

5. Conclusion

Analysis of various parameters of water quality of ponds of Abhanpur indicates that few of the ponds of this area contain water near the permissible limit of WHO standards. In the remote village area the harmful effects of urbanization and industrialization do not exist. The pond water of this area is although not perfect for drinking but can be utilized for domestic purposes and the proper management of these water bodies for the future prospective is needed.

6. Acknowledgement

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