



COMPARATIVE STUDIES ON THE WATER QUALITY STATUS OF NAGPUR RESERVOIRS.

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ABSTRACT:

Water is regarded as the elixir of life. At least on this planet earth, life cannot be imagined without water. Water is one of the abundantly available substances in nature. It is essential ingredient of animal and plant life. It is important to all living organisms, most ecological systems, human health, food production and economic development. Poor quality of water causes many problems to the humans, animals, plants etc. So the water must be tested physico-chemically as well as bacteriologically. Water samples were collected from the chosen sampling points of the four reservoirs and analyzed as per APHA standard methods. During the study it was found that maximum number of physical and chemical parameter were within the prescribed limit, as suggested by WHO(1971) and BIS(1991). The objective of the present study is to provide information on the physico-chemical characteristics of reservoir in order to discuss its suitability for human use. From the analysis report, it was found that the water analyzed from the four reservoirs was fit for irrigations, agricultural, industrial and domestic purpose.

Key words :- Reservoirs, water quality index, Nagpur, Physico-chemical and Investigation, ecological studies, Comparative studies

INTRODUCTION:

Water is one of the most important of all natural resources known on earth. It is important to all living organisms, ecological systems, human health, food production and economic development. The safety of drinking water is important for the health. The safety of drinking water is affected by various contaminants which included chemical and microbiological. Such contaminants cause serious health problems. Due to these contaminants quality of drinking water becomes poor. Sometimes such poor quality water causes many diseases in the humans, so that quality of water must be tested for both the chemical as well as for the microbial contaminants. The 5 major Application of water are Hydropower, Domestic uses, Irrigation, Industrial uses, Commercial uses. The major water quality parameters considered for the examination in this study are pH, Odour, Colour, Taste, Temperature, Turbidity, Total Dissolved Solids (TDS), Dissolved oxygen (DO), Dissolved carbon dioxide, Metals and Metalloids, Total Hardness, Alkalinity.

Sample Collection:

Water sample was collected from four different reservoirs of Nagpur.

- Gandhisagar Reservoir.
- Sakkardara Reservoir.
- Ambazari Reservoir.
- Futala Reservoir.

MATERIALS AND METHODS:

The present study was carried out for four different water reservoirs, located in Nagpur city. In the present study the sampling was done during morning hours and all water samples were collected in the polyethylene bottles. For water sample collection, the closed bottle was dipped in the lake at the depth of 0.8 to 1.0 m, and then a bottle was opened inside and was closed again to bring it out at the surface. The samples were collected from four different points and were mixed together to prepare an integrated sample. From the time of sample collection and to the time of actual analysis, many physical and chemical reactions would change the quality of water sample therefore to minimize this change the sample were preserved soon after the collection. The water samples were preserved by adding chemical preservatives and by lowering the temperature. The water temperature, odour, taste, total dissolved solids were analyzed immediately on the spot after the collection, whereas the analyses of remaining

parameters were done in the laboratory. The study was carried for a period of four month (February 2016 to May 2016). The collected water samples were brought to the laboratory and relevant analysis was performed. pH was determined using pH meter, and similarly turbidity is measured by Turbidity meter. Alkalinity, Chloride, Calcium, Magnesium, Total Hardness, Dissolved oxygen, Dissolved carbon dioxide, Chemical Oxygen Demand (COD) Sulphate and Phosphate were determined by method according to table (Verma Pradeep et al, 2012).

RESULTS AND DISCUSSION

Physical parameters like temperature, odour and colour were agreeable but the taste of water is objectionable. Turbidity of the reservoir is ranging from 0.7 to 1.0 NTU. In Sakkardara reservoir, it has been observed that the turbidity (14NTU) is higher than the other water reservoirs. The pH value of all the reservoir has been observed in the range 6.9 to 8.2. This pH range is not at all harmful for the human use. Dissolved carbon dioxide and Dissolved oxygen were found to be 6.4 to 33mg/l (average value of four reservoirs) respectively. Total Dissolved Solid (TDS) of water sample is within the prescribed limit. Total hardness and chloride is more in the water sample in all the reservoirs as compared to prescribed limit. Chemical Oxygen Demand (COD) and sulphate are also within the limit in all the water reservoirs. So, this water sample can be used for domestic, industrial and commercial but this water sample is unfit for drinking purposes. Water Temperature may be depending on the season, geographic location and sampling time. As water temperature increases, it makes it more difficult for aquatic life to get sufficient oxygen to meet its need. Thermal pollution can cause shifts in the community structure of aquatic organisms. Turbidity of lake ranges from 4 NTU to 11 NTU. Some are naturally highly turbid but human activities have increased the levels of suspended solids in many habitats. High value of suspended solid can lower the primary

productivity of system by covering the algae and macrophytes, at times leading to almost their complete removal. The low oxygen level was recorded during summer mainly due to removal of free oxygen through respiration by bacteria and other animals as well as the oxygen demand for decomposition of organic matter. DO is the single most important gas for most aquatic organism. If the amount of free oxygen go below then 2.0 mg/l for few day in the lake containing aquatic organism it would lead the killing of most of the biota in the aquatic system. Higher value of free carbon dioxide generally coincided with minimum dissolved oxygen. Habited water is generally used by animals & birds & aquatic life. The disturbance in this biological system & ecological system may affect health of animals & birds & aquatic life. After physicochemical analysis we found that the sample of habited water is free from pollution & ecologically balanced. Effectiveness of concentrated sulphuric acid, hot water and hot air oven treatment for breaking hardseededness was also reported in related crops by Borikar et al. (1985), Radhakrishnan et al. (1989), Rana and Nautiyal. (1989), Tomer and Maguire. (1989), Verma and Singh. (1989), Charjan and Tarar. (1991), Singh and Tomer. (1993) and Cherian et al. (2011).

CONCLUSION :

In the present study it has been observed that the result obtained of the water reservoirs are compared with ISI standards. It has been found that Sakkardara and Futala Water Reservoir are polluted as compared to other water reservoir. Therefore this reservoir can't be utilized for human uses, but Ambazari and Gandhisagar Water reservoir can be utilized for human uses. The entire water reservoir is generally used by animal's birds and aquatic life. The disturbance in this biological system and ecological system may affect health of animal birds and aquatic life. After Physico-Chemical Analysis it has been found that water sample of Ambazari and Gandhi sagar Water reservoir are less polluted and ecologically balanced as

compared to Sakkaradara and Futala Water Reservoirs.

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Table-1:Water quality parameters and methodology used.

S.No.	Water quality test	Description	Instrument/Method.
1.	Temperature	Temperature exerts a major influence on the biological activities and growth.	Thermometer
2.	Colour	The term colour is used to mean the true colour of water from which turbidity has been removed.	Platinum cobalt (visual comparison) method
3.	Odour	Odour is recognized as a quality factor affecting acceptability of drinking water.	Wide mouth glass stoppered bottle
4.	Taste	Taste of water ranging from agreeable to disagreeable	By Tasting
5.	pH	The major of acidity (hydronium ion, H ⁺) in the water.	pH meter
6.	Turbidity(NTU)	Turbidity in water is the reduction of transparency.	Turbidity meter
7.	TDS	The measure of the amount of particulate solids that are in the water	TDS meter
8.	Dissolved oxygen	The amount of oxygen available in the water.	Titrimetric method (iodometric)
9.	Dissolved carbon dioxide	The amount of carbon dioxide in the water.	Titrimetric method
10.	Alkalinity	Alkalinity of water is its quantitative capacity to react with a strong acid to a designated pH.	Titrimetric method
11.	Acidity	Acidity of water is its quantitative capacity	Titrimetric method

		to react with a strong base to a designated pH.	
12.	Chloride	Measurement of chloride amount in water	Titrimetric method
13.	Chemical Oxygen Demand (COD)	Amount of organic matter present in water	Titrimetric method (Iodometric)
14.	Magnesium	Measurement of Magnesium amount in water	Titrimetric method
15.	Calcium	Measurement of Magnesium amount in water	Titrimetric method
16.	Total hardness	Measurement of calcium and magnesium in water.	Titrimetric method (complexometric)
17.	Sulphate	Measurement of Sulphate in water	Spectrophotometer

Table- 2: Results of different water reservoirs.

Sr.No.	Test	Gandhisagar	Sakkardara	Futala	Ambazari
1.	Temperature (^o C)	29	28	30	28
2.	Colour (Unit)	<1	<1	<1	<1
3.	Odour	Agreeable	Agreeable	Agreeable	Agreeable
4.	Taste	Agreeable	Agreeable	Agreeable	Agreeable
5.	pH	6.9	8.2	7.5	7.8
6.	Turbidity (NTU)	0.8	14	0.9	0.7
7.	TDS (ppm)	350	365	356	364
8.	Dissolved oxygen (ppm)	6.1	6.2	6.3	6.4
9.	Dissolved CO ₂ (ppm)	38	36	40	38
10.	Alkalinity (ppm)	58	62	65	70
11.	Acidity (ppm)	Nil	Nil	Nil	Nil
12.	Chloride (ppm)	265	278	270	280
13.	COD (ppm)	80	75	78	85
14.	Magnesium (ppm)	25	23	22	26
15.	Calcium (ppm)	62	66	64	60
16.	Total Hardness (ppm)	220	217	205	210
17.	Sulphate (ppm)	28	30	24	26