Seasonal Variations in Different Physico-Chemical Characteristics of Wakan Reservoir Near Nagothane, District Raigad (M.S.), India

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Abstract - The Wakan reservoir is medium size reservoir, constructed on the Amba river, near Nagothane, Taluka Roha, Dist. Raigad, Maharashtra. The reservoir is used for irrigation and supply of drinking water to Nagothane and also for domestic purpose. Monthly and seasonal variations of different physico-chemical characteristics were studied from January2017 to December 2017 to enhance the physicochemical knowledge and can provide valuable information to the planner's and authorities to plan out strategies for the development of drinking water supply and fisheries. The results clearly indicate that water quality parameters are within the permissible limits for drinking, surface water for irrigation and also suitable for fisheries

Key words: Wakan reservoir, physico-chemical, Domestic,Grampanchayat.

I. INTRODUCTION

The Wakan reservoir is small size reservoir, constructed on the Amba river, near Nagothane. It is one of the developing towns in Roha Taluka. Raigad is one of the important industrially developed districts in Maharashtra. It lies at the bank of Arabian Sea. The geographical position of it is 17^0. 51 North's to 19^0.80 South latitude and 72^0.51 easts to 73^0.40 west longitude. Hilly area is one of the important silent features of this area. Amba river is the important source for water to the population in the vicinity. The water from the reservoir is utilized for irrigation and drinking purpose as well as for fishing. However, as basic data on the water quality of the reservoir is not available and to bridge this gap, the present investigation was undertaken during the year 2017. The main purpose was to gain a basic knowledge of the Waken reservoir for the enhancement of water quality knowledge and that will also ultimately useful for better fishing and agriculture purposes.

II. MATERIALS AND METHODS

By considering the morphometric features of reservoir on the basis of topography two sampling sites (Site I East bank , Site II West bank) were selected. Monthly studies of water quality were carried out at the two sampling sites during January 2017 to December 2017. The water samples were collected between 11 am to 12 pm and physico-chemical parameters viz., Temperature, transparency, pH, total dissolved solids, free carbon di-oxide, dissolved oxygen (DO), total alkalinity, chlorides, etc were estimated by employing standard methods (APHA, 1985; Trivedy and Goel, 1984, De 1998, Moore and Ramamoorthy1984 and Bandela et al 2005).

III. RESULT AND DISCUSSION

The minimum and maximum values of selected physico-chemical parameters from two different sites of Wakan reservoir are shown in Table 1.

Table 1. Range of water quality parameters at two sampling stations of Wakan reservoir.

No.	Parameters	Station I-East Bank	Station II- West Bank
1	Temperature	25.9 – 28.8	24.5 – 29.0
2	Transparency	30.5 – 60.0	32.0 – 70.5
3	pH	7.5 – 8.5	7.2 – 8.0
4	Total dissolved Solids	188 – 300	160 – 340
5	Free carbon di-oxide	0 – 0.2	0 – 0.3
6	Dissolved oxygen	4.5 – 9.8	3.8 – 9.2
7	Total alkalinity	165 – 275	180 – 290
8	Chlorides	25.2 – 48.2	22.3 – 42.6

Temperature: In the present investigation the range of water temperature was 25.9 ^{O}C-28.8 ^{O}C at station I and 2405 ^{O}C-29.0 ^{O}C at station II. The higher values recorded in summer months; moderate in monsoon and little slower in winter months. In a similar study Kodarkar (2006) observed that during summer, water temperature was high due to low water level and clear atmosphere. This is quite similar with results obtained in the present investigation.

Transparency: It is inversely proportional to turbidity created by suspended inorganic and organic matter (Saxena, 1987). The transparency expressed in cm ranged between 30.5 to to 60.0 at Station I and 323.0 to 70.5 at station II. The water was less transparent during monsoon as compared to winter or summer. According to Das (1996) high Sacchi disc transparencies indicate insufficient

phytoplankton productivity and availability of enough fish food organisms for good fish production.

pH: The pH of water ranged between 7.5 to 8.5 at station I and 7.2 to 8.0 at station II, which indicating alkaline nature of the reservoir water. The maximum pH was 8.5 during May 2017. Further, the parameter did no show definite seasonal variation. Generally, fish get prone to attack by parasites and become diseased in acid waters (Deshmukh,2001). Fishes in Wakan reservoir are free from such kind of hazard as the pH ranged between 7.2 to 8.5.

Total Dissolved Solids: The total dissolved solids (TDS) were variable and ranged between 188-300 mg/lit.at station I and 160-340 at Station II. The minimum value was recorded at site II during winter and maximum was also at site II during monsoon. The amount of dissolved solids, which increases due to the release of decaying matter from aquatic vegetation. The results are coinciding with earlier work carried out by Verma *et al.* (1978) and Salodia (1996).

Free CO_2: Its values varied considerably throughout the year i.e.0.0-0.2 at station I and 0.0 to 0.3 at station II. Low values or an absence of Free CO_2 as observed during summer, could be mainly because of its complete utilization in the photosynthetic activity. Deshmukh (2001) had also reported absence of free carbon dioxide for 8 months (from August to March) in Chhatri lake, Amravati, Maharashtra.

Dissolved Oxygen: In the present study, low values of DO (3.8) were recorded during summer season, while DO levels were high (9.8) in winter season. Shashikant and Raina (1990) reported that the minima and maxima in the concentration of dissolved oxygen in ponds are directly related with the maxima and minima of the phytoplankton. The dissolved oxygen (DO) is some time referred to as measure of the pulse of an aquatic ecosystem. The optimum range of dissolved oxygen in natural waters is 4 – 6 mg/l (Jayasree, 2002).

Total Alkalinity: The total alkalinity shows marked seasonal variations i.e. 165-275 at station I and 180-290 at station II. The values were high during winter and low during monsoon. The steep fall in values was during monsoon and may be due to dilution of water. However, most of the waters are rich in carbonates and bicarbonates with little concentration of other alkalinity imparting ions (Trivedy and Goel, 1984).

Chlorides: In the Wakan reservoir the chloride concentration also exhibited seasonal variations i.e 25.2 to 48.2 at station I and 22.3 to 42.6 at station II. The higher values of chlorides were recorded in summer and lower in monsoon. The high values may be attributed to low water levels during summer (Kodarkar, 2006). The values of chloride were not found to be very high, throughout the year in the present study (BIS).

IV. CONCLUSION

From the present investigation it was concluded that the water quality of Wakan reservoir is in permissible limits. Therefore population from the vicinity can be use this water for drinking purpose with proper treatment methods adopted by Grampanchayat and MIDC water treatment plants. It also concludes that Waken reservoir water is safe for the use of irrigation and ecosystem is suitable for exploitation for fisheries and aquaculture.

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