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ASSESSMENT OF PHYSICO-CHEMICAL PROPERTIES OF WANG-MARATHWADI DAM, TEHSIL- PATAN SATARA DISTRICT, MAHARASHTRA, (INDIA).

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ABSTRACT

This paper presents the study of physicochemical parameters of Wang-Marathwadi dam of tehsil Patan, Satara District of Maharashtra state. Monthly changes in physical and chemical parameters such as Water temperature, Transparency, Turbidity, Total Hardness, Chlorides, Phosphates, total dissolved solids, PH, dissolved oxygen, free carbon dioxide, Alkalinity, and Nitrates were analyzed during Monsoon, Post Monsoon and summer season. The work was carried out during the year 2024 (January to Dec.). The results of the present investigation have been discussed from that is clear that the water of this reservoir is not polluted but the variations in physic-chemical parameters were observed as seasonally. The result indicate that the reservoir is non-polluted and the recorded rang of the physicochemical parameters were within the maximum permissible limit. So the water can be used for Domestic, Irrigation and Pisciculture purpose.

KEYWORDS: Wang-Marathwadi Dam, Physic-Chemical Parameters, Monthly Variations

INTRODUCTION

Wang-Marathwadi dam is a medium Irrigation Project constructed in the Krishna basin in Satara district of Maharashtra. The Wang-Marathwadi Irrigation Project is 1255 m long earth dam with the maximum height of 50.63 m. A series of 10 KT weirs d/s of the dam along the Wang river through which water lifted to provide an annual irrigation to 7068 ha in Patan and Karad talukas of Satara district. In all, 46 villages are getting irrigation benefits from this project and 7068 ha of the land ultimately come under irrigation potential. The project has proposed to provide 5.63 Mm3 water for domestic use and 2.83 Mm3 water for industrial use

Wang-Marathwadi dam is located in Patan tehsil and about 42 km away from Patan, 82 km away from Satara of Maharashtra state. This dam is built on Wang River. It lies between 17.21775°N and 73.93228°E. It is Earth fill dam. The dam water is basically used for domestic, agriculture purpose. The climatic conditions of study area were hot in summer and cool in winter. From the catchment area of the dam water is stored from June to September.

MATERIALS AND METHODS

The water samples from Wang Marathwadi dam were collected from three different sampling stations for the study. The samples were collected monthly in the morning hours from 8.30 am to 10.00 am. The inlet point; outlet point and near about center of the dam that is third site selected for study. The water samples were collected in polyethylene bottles having two liter capacity. Bottles were labeled properly and analyzed in laboratory for their physicochemical properties. At the time of sample collection Water temperature, Transparency and PH were recorded. The transparency was measured with the help of Secchi Disc. The water temperature was recorded at the fixed sites of the dam by using a mercury thermometer. The pH of water was determined by pH meter (Hanna Model Champ). The other parameters were analyzed in the laboratory by using standard methods as prescribed by American Public Health Association (APHA 1980), Trivedy et. al. (1998) and Kodarkar et. al. (1998). The study was completed in the year 2024 (January- December).

Figure 1: Google Map of study area Wang-Marathwadi dam, Tehsil- Patan District- Satara, M.S. (India).

RESULTS AND DISCUSSION

The monthly variations of physicochemical parameters are given in Table.

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Water Temperature:
In the present investigation the water temperature of the dam ranged from 22.2^{0}C to 26.5^{0}C. In the present investigation the season wise analysis showed that the average water temperature in the dam was maximum during summer (March), minimum during winter (December) and moderate during monsoon seasons. The water temperature was consistently lower than the atmospheric temperature. Similar results were observed by Jayabhaye, et al; Salve and Hiware that because of low water level, high temperature and clear atmosphere water temperature was high during summer.

Transparency
Water transparency is a physical variable which we can measure and it is quite important for production. Transparency and turbidity are quite related parameters, transparency is inversely proportional to turbidity which created by suspended matter. In our study in November maximum transparency recorded was 64.5 and minimum 8.2 recorded in month of June. The less transparency in June might be due to suspended particles brought in monsoon season.

Dissolved oxygen
For survival of aquatic life dissolved oxygen is an important factor. High DO content is an indication of healthy system in a water body (Bilgrami and Datta Munshi, 1979). The amount of dissolved oxygen varies from 6.1 mg/lit to 11.5 mg/lit during study period. This indicates that the dam is not polluted. At the site III near villages the dissolved oxygen was low this might be due to domestic use like washing clothes, animals and other human activities. The amount of DO in the dam is varied from season to season. The maximum DO was recorded during May and in October reached the lowest concentration.

Free CO2
Trivedy and Pande (2002) reported that the main source of free CO_2 was mainly greater decomposition of organic matter and respiration of plants and animals. The monthly variations free CO_2 have showed the minimum value of 2.6 mg/lit in the month of May and the maximum value of 18.6 mg/lit was observed in the month of January. The minimum values of free CO_2 observed from March to May might be due to high rate of photosynthesis. The high value of CO_2 in summer seasons might be due to higher rate of decomposition of organic materials in the warmer months.

Total Alkalinity
According to Jackson(1961) alkalinity below 50 mg/lit.indicates low photosynthetic rate in the reservoir. Total Alkalinity found in this dam was above 48 mg/lit. Total Alkalinity ranged from 48 mg/lit. in the month of January to 114 mg/lit in the May. The maximum Total Alkalinity was recorded during summer and in rainy season values reached the lowest concentration. Same results were also observed in Total Alkalinity Shaikh et. al.(1997), Manjare et. al.(2009), and Shinde et. al.(2010). Higher values of alkalinity observed during summer might be due to the production of excess of free CO_2 product as a result of photosynthesis, decomposition process coupled with mixing of sewage and domestic waste.

Total Dissolved Solids:
The Total Dissolved Solids values of Wang-Marathwadi dam varied from 50.00 mg/lit in February to 132.00 mg/lit.in the May during study period. The observed values of TDS showed that it was higher in summer and lower in monsoon..

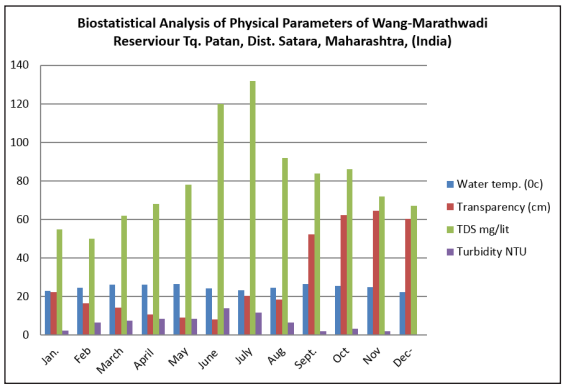
Turbidity
Clearness of water is measured by turbidity. The turbidity of fluctuates varies from 0.2 to 14.0 NTU. The maximum value observed in the month of June may be due to human activities and rainfall. The minimum value recorded in the month of December.

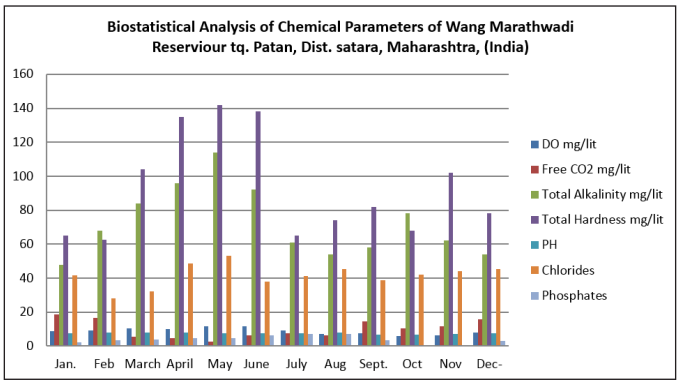
Total Hardness
The total hardness of water is due to concentration of salts mainly metallic ions of calcium and mangnesium. The total hardness of water observed in this reservoir ranges from 62.5 mg/lit to 142 mg/lit. The minimum values observed in the month of February and the maximum values observed in the month of May. The total hardness was high during summer might be due to decrease in water volume and increased rate of evaporation of water.

P^H-(Hydrogen Ion Concentration) -
Almost all the biological processes and biochemical reactions are pH dependent. Adarsh Kumar et. al.(2006). pH is important parameter which determines the suitability of water for various purposes. In the one year investigation the range of water pH was maximum in the month Of March 7.82 and 6.82 was minimum in the month October. Khan and Siddiqui (1978) reported that fluctuation in pH values were mainly due to photosynthetic activity of Phytoplankton and other higher aquatic plants.

Chlorides
In the present investigation the chloride values fluctuates from 28.06 to 53.06 mg/lit. The maximum values recorded 53.06 in the month of May (summer) and minimum values observed 28.06mg/lit in the month of February. The maximum value observed in summer in our study. Similar results were observed by Swarnalatha and Narsing rao.

Phosphates
The values of phosphates range from 0.14 mg/lit to 7.18 mg/lit. The higher values were recorded in the month of August is 7.18 mg/lit and lowest values recorded is 0.14 mg/lit in the month of August. The high values of phosphates might be due to monsoon rain and agricultural runoff. Cloth washing also contributes for the inorganic phosphates.





Month	Water temp. (^{0}c)	Transparency (cm)	Dissolved Oxygen mg/lit	Free CO_2 mg/ lit	Total alkalinity mg/lit	Total Dissolved solids mg/lit	TurbidityNTU
Jan.	23	22.2	8.6	18.6	48	55	2.5
Feb	24.5	16.4	9.06	16.4	68	50	6.4
March	26.2	14.4	10.5	5.5	84	62	7.6
April	26.3	10.6	10.0	4.6	96	68	8.4
May	26.4	9.2	11.5	2.6	114	78	8.6
June	24.4	8.2	11.5	6.5	92	120	14.0
July	23.2	20.5	9.04	7.5	61	132	11.6
Aug	24.5	18.5	7.3	6.5	54	92	6.4
Sept.	26.5	52.4	7.7	14.4	58	84	2.2
Oct	25.5	62.4	6.1	10.5	78	86	3.4
Nov	24.8	64.5	6.4	11.5	62	72	2.2
Dec-	22.2	60.2	7.9	15.6	54	67	0.2

Month	Total Hardness mg/lit	pH	Chlorides mg/lit	Phosphates mg/lit
Jan. 2024	65	7.6	41.56	2.12
Feb	62.5	7.82	28.06	3.38
March	104	7.82	32.02	3.88
April	135	7.78	48.46	4.56
May	142	7.66	53.06	4.78
June	138	7.72	38.02	6.24
July	65	7.72	41.24	7.16
August	74	7.78	45.22	7.18
September	82	6.85	38.88	3.26
Oct	68	6.82	42.12	0.14
Nov	102	6.94	44.24	0.22
Dec.2024	78	7.52	45.48	3.24

Table 1: Physicochemical Parameters of Wang-Marathwadi dam During January 2024 to December 2024

CONCLUSION

In the present study the observed values of various Physico-chemical parameters were found within the permissible limit as described by WHO and BIS thus the water of Wang-Marathwadi reservoir satisfy all the requirement for its use in various purposes like pisciculture, agriculture and drinking purpose.

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