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Seasonal Variations in Physicochemical Characteristics of "Ram Mandir Pond", Vasai, Dist. - Palghar, Maharashtra (INDIA)

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Abstract: ***Ponds remain importantresources of water from ancient time. Vasai - Virar city is suburban part of Mumbai city comes under district Palghar. In the city there are more than 100 pounds on record. Of these ponds 'Ram Mandir Pond' situated in the heart of city.20 physicochemical parameters selected for studying pond water were Temperature, pH, Conductivity, Turbidity, Total solids, DS, TSS Dissolved Oxygen, Acidity, Alkalinity, BOD, COD, Nitrate, Nitrite, Total Phosphorus, Silica as*** SiO_2***, Sulphate,*** H_2S***, Chlorides as Cl, and Total hardness as*** $CaCO_3$ ***Physicochemical study of this pond reveals seasonal variation of pH of water ranging from 6.65 to the higher as 8.93. Seasonal variation in Total hardness ranging from 470 to 860 mg/l of carbonates. Nitrate values in water found highest during winter i.e. 1.11mg/l and lowest during Monsoon i.e. 0.377 mg/. Total phosphorus recorded in three seasons was 0.27, 0.16 and 0.12 mg/l in monsoon winter and summer respectively. Most of the parameters are in and around standard values. Physicochemical studies indicate pond is of mesotrophic category. Remedies for its conservation and maintenance are suggested.***
Key words: Physicochemical parameters, Trophic level of pond, pond conservation pond maintenance.

I. INTRODUCTION

Temple pondsare the ages old tradition of Indian culture.Temple ponds, often referred to as temple tanks or sacred ponds, hold significant cultural and religious importance in India. These ponds are typically located within or near Hindu temples and serve various purposes that are deeply rooted in tradition and spirituality.Temple ponds are considered sacred bodies of water.Before entering the temple for worship, devotees often ritually purify themselves by taking a dip in the temple pond. This act symbolizes the cleansing of both body and mind, preparing the devotee for spiritual communion with the deity.Beyond their religious significance, temple ponds play a practical role in local ecology. They often serve as reservoirs for rainwater harvesting, supporting groundwater recharge and maintaining biodiversity by providing habitats for various aquatic species.

Overall, temple ponds in India are not just bodies of water; they are repositories of cultural heritage, religious devotion, and ecological balance, embodying the interconnectedness of spirituality and sustainability in Indian traditions.In recent times, some temple ponds have faced challenges such as pollution, neglect, and encroachment. Physicochemical and biological parametershelp to understand the quality of water and ecology of the pond (Arti & Saxena,2012) (AmarendraHari Chandan et al. 2016).Hence study of selected pond is planned toknow the status of the pond and suggestions for preservation and restoration of this important cultural and ecological assets.

II. MATERIALS & METHODS

A. Study area:

Location Vasai Virar with a jurisdiction of about 311 sq. km. is geographically located at 19.3919° N, Latitude and 72.8397° E Longitude at about 36 feet above mean sea level. It is located in Maharashtra, India's Konkan region. Vasai-Virar is one of the twin cities that make up the Mumbai Metropolitan Region (MMR). Vasai-Virar city has been separated from Greater Mumbai and Mira-Bhayandar City by Vasai Creek.

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Figure 1 Ram mandir Pond in Bolinj Virar a Satellite View.



Figure 2 Ram mandir Pond in Bolinj Virar- measurement.

Ram Mandir Pond is situated in Bolinj Division of Vasai Virar city. Bolinj is an old part of Present city having ancient temple of deity Shree Ram. Pond is on right side (south) of the temple (towards south). Pond is about 3 km from Virar railway station. Location of the pond is 19°26'32.6"N 72°47'43.0"E. The temple pond is recently protected by constructed concrete walls and iron bars. Rain water is the only source of temple pond.

Physicochemical Analysis:Physicochemical analysis of water sample from the Ram Mandir Pond is carried about during the year 2020-21. Water samples collected in the Morning Between 7 am to 10 am. 20 Physicochemical parameters selected for the study were Temperature, pH, Conductivity, Turbidity, Total solids, DS, TSS Dissolved Oxygen, Acidity, Alkalinity, BOD, COD, Nitrate, Nitrite, Total Phosphorus, Silica as SiO_2, Sulphate, H_2S, Chlorides as Cl, and Total hardness as $CaCO_3$.All analysis was done following the standard method of APHA 22nd Edition (2012), Trivedi RK, Goel PK (1984) Chemical and Biological Methods for Water Pollution Studies and guide manual: water and wastewater analysis (CPCB).

III. RESULT & DISCUSSION

Results of Physicochemical parameters analysis is presented in the table 1. TemperatureDifference in ambient and water temperature is very negligible. Water temperature recoded were 28^0 C in Monsoon and 27^0 C in Winter and 29^0 C during Summer.Amb. temperature remained slightly higher than the water temperature throughout the study period. Temperature is connected to other non-living factors such as sunlight, dissolved oxygen and turbidity. Warm water does not hold as much dissolved oxygen as cold water; therefore, dissolved oxygen levels drop as a pond heats up in the summer.

pH ranges from 6.05 to 8.93. Highest pH wasrecorded during the summer. During winter it was 8.05. pH from 6.5 to 8.5 is Permissible range. During Summer it slightly crossing the limits.In general, basic ponds with high pH values tend to be more productive than acidic ponds with low pH values. (Shanthi k et al,2002).

µmhos/cm. lowest in winter and high during monsoon and summer. According to Bhatt et al. (1999) EC in water is due to ionization of dissolved inorganic solids and is a measure of total dissolved solids and salinity. Salts that dissolved in water break in to positively charged and negatively charged ions.Shannon & Brezonick (1972) considered electrical conductivity as an indicator of trophic status.According to them Electrical conductivity is caused because of the presence of solids in water therefore these two parameters (EC & TDS) are closely related.

Table 1 Physicochemical parameters analysis of Ram Mandir Pond

SR. NO.	PARAMETERS	MONSOON	WINTER	SUMMER
1	Amb. Temperature	27	24	30
	Water Temperature	28	27	29
2	pH	6.65	8.05	8.93
3	Conductivity (m mho)	2.72	1.665	2.01
4	Turbidity (NTU)	2	5.2	9.5
5	Total solids (mg/L)	1740	1240	1520
6	TDS (mg/L)	840	1100	1290
7	TSS (mg/L)	900	140	230
8	Dissolved Oxygen (mg/L)	1.2	1.3	3.12
9	Acidity (mg/L)	100	50	100
10	Alkalinity (mg/L)	900	950	450
11	BOD	1	1	0.48
12	COD	88	44	88

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13	Nitrate (mg/L)	0.377	1.11	1.15
14	Nitrite (mg/L)	0.14	0.17	0.12
15	Total Phosphorus (mg/L)	0.27	0.16	0.121
16	Silica as SiO2 (mg/L)	6.52	0.71	0.745
17	Sulphate (mg/L)	112	55.18	52.05
18	H2S	36.14	12.75	8.5
19	Chlorides as Cl (mg/L)	603.5	383.4	447.3
20	Total hardness as CaCO3	480	860	470

Both water color and turbidity affect the penetration of light into lakes and ponds. Turbidity refers to water cloudiness and represents the concentration of suspended particles in the water. The most common types of suspended particles in ponds are sediments and phytoplankton.in present study turbidity was recorded 2NTU in Monsson 5.2 NTU during winter and Highest value 9.5 NTU during summer. High value maybe due to evaporation of water and growth of Phytoplankton.

TDS varied from 840 mg/L to 1290 mg/L at Ram Mandir Pond whereas TDS. highest value recorded during summer. TSS (Total suspended solids) recoded in present study highest during monsoon 900 mg/L during monsoon and 230mg/L during summer and 140 mg/L during winter season. Total solids also exhibit the same trend like TSS i.e. 1740 mg/L in mansoon,1240 mg/L in winter and highest 1520 mg/L in summer.

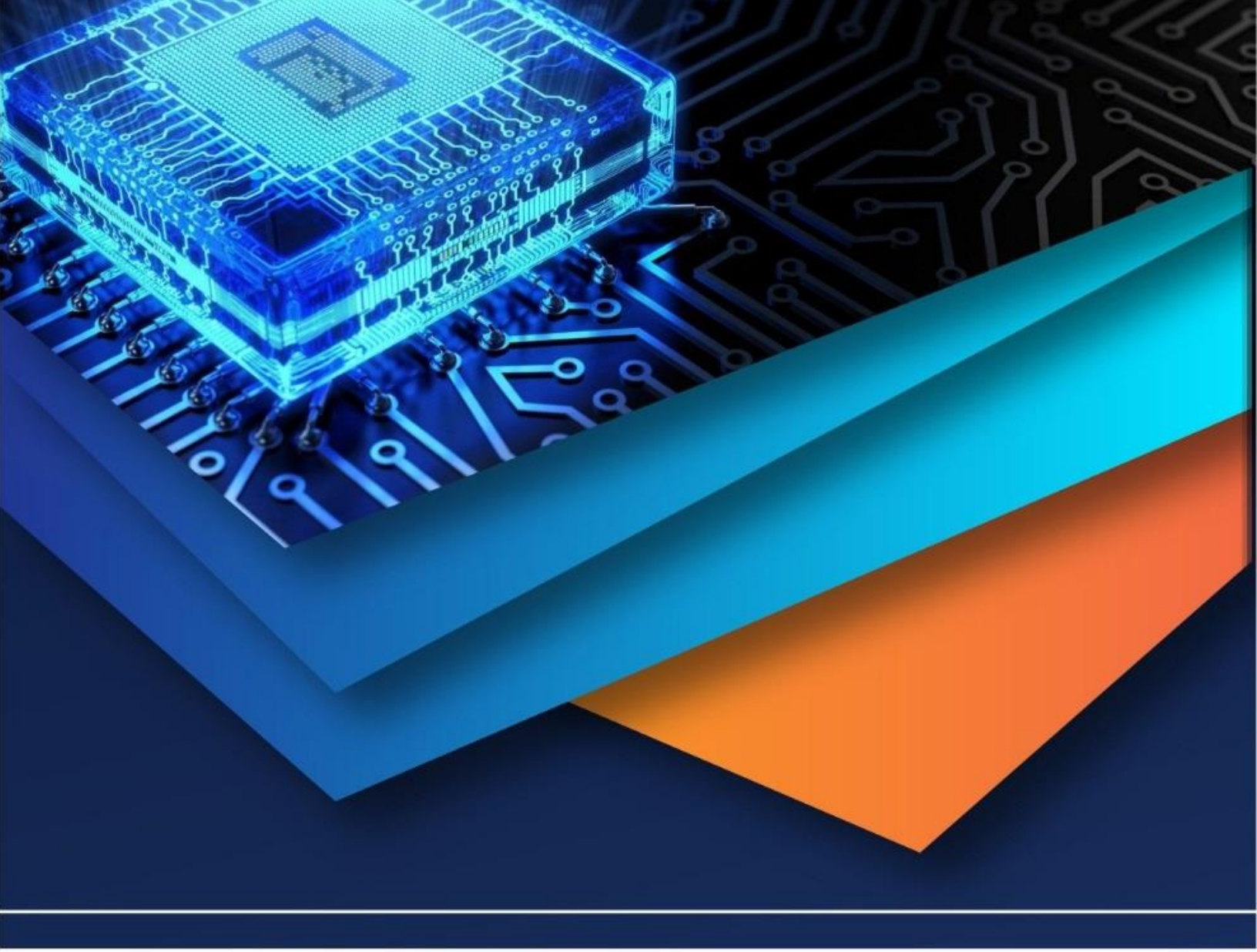
Dissolve oxygen important for the for the survival of aquatic organism.3.5 to 5 Mg/L is limit for the DO. During monsoon and winter, it found low. Whereas, during summer it was found suitable 3.12. Acidity of water sample ranges from 50 to 100 mg/L and alkalinity ranging from 450 to 900 mg/L. which is suitable for aquatic life. Mean BOD recorded was 1. It lowered during simmer to 0.48 and COD lowered to 0.48 during winter. Highestvalueof nitrate was 1.15 during summer and Nitrite found highest during winter i.e. 1.17 mg/L. Phosphorusshowed high value 0.27 during monsoon and lower during winter and summer Highvalue Si 6.52 found during monsoon. Similarly sulphate vale recorded 112 mg/L during monsoon which was highest among three seasons.H2S also high during monsoon i.e. 36.14. Chlorides in the same trend found high during monsoon. 603 and lowest 383.4 during winter. Total hardness values recorded ranges from 470 to 860mg/L. During winter hardness found to be at its peak.

IV. CONCLUSION

Most of Studied parameter are in good range indicating suitability for aquatic life. pH range is within permissible limit. Total Solids showed higher values. BOD, Phosphorus Nitrate nitrates are within permissible limit. Total hardness surpassed the limit during winter only. From above study it is concluded that it is suitable for the aquaculture, agriculture andotheruses.However, suitability for drinking purpose must be depended on the further study of water sample for microbial content and presence of heavy metals.

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