

THE PHYSICO- CHEMICAL CHARACTERISTICS OF SELECTED WATER BODIES MANJIRA RIVER

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ABSTRACT

The Manjeera-Singur Catchment is one of the agriculturally intensive watersheds in Telangana, where in, nitrate surface loadings have severely influenced groundwater nitrate concentrations of the aquifer. Also, Singur Reservoir is catering to roughly 40 percent drinking demands of the Hyderabad metropolis. A detailed examination of nitrates movement in surface and groundwater sources may aid water managers of the region in conducting water conservation strategies and create guidance on water usage particular to the research area. The conceptual model of the Manjeera-Singur Catchment in Sadasivapet Mandal, Medak District, Telangana was built in the current research using SWAT.

KEYWORDS Phytoplankton, Physico-chemical parameters, Water quality

INTRODUCTION

There has been a growth in the number of people, industry, and agricultural methods that change the chemical composition of water, making it a limited resource for living organisms. When it comes to sustainable resource development and management, particular information on water quality is essential. Because of the health hazards associated with groundwater's chemical elements, it cannot be argued that supply is safe. As a result, a better understanding of hydro geochemical processes that regulate the chemical composition of groundwater may lead to more efficient management and usage of the groundwater resource by elucidating the relationships among different hydro geological factors. As a result, the focus of this research is on the hydrochemical properties of groundwater and quality parameters in and around the Manjira river in the Medak region of Andhra Pradesh. More than a million devotees gather in Nasik every twelve years for the Pushkaram (Kumbh Mela) bathing festival, which takes place on the banks of the Godavari river. When Lord Vishnu fled from Earth to Heaven after Samudra Manthan, legendary legends and poems of epics claim that drips of Amrita or nectar landed at the Godavari River near Nasik. It's a great honour for the two sanctified bathing ghats at Ramkund and Kushavartha, where millions of Hindu pilgrims come to bathe in the holy Godavari on specified days and at specific times.

LITERATURE REVIEW

MOHAMMED ZAKIR HUSSAIN, ET.AL (2019) The desire to conserve water while natural resources are accessible is a universal demand. The river MUSI, which originates in the Anathagiri Hills and travels almost 256 kilometres before joining the Krishna River in the Indian state of Telangana, is the subject of this research. Growing capital is influenced by urbanisation and industrialisation. When compared to a century before, the natural flow phenomena of the Musi River in Hyderabad has been altered. Previously, most people relied on lakes like Himayathsagar, Usmansagar, and others for drinking water. The water demands of the state's capital are significant, especially in light of the ongoing growth. However, it is true that the Musi River has been significantly polluted over the last two to three decades, and investigations are required to correct the heavy metal additions that are harmful to human health, such as sewage and chemical industrial waste. Impurities were examined in depth, as well as the factors that contributed to their presence and the steps necessary to remove them.

P. PRAVEEN CHARI ET.AL (2019) A lake that has been designated a Biodiversity Heritage Site (BHS) by the National Biodiversity Authority (NBA) is the focus of this study (NBA). Located in an urban setting, this is a new kind of BHS for the first time in North Carolina. The major goal of this study is to analyse the physical and chemical features of the lake water, determine the causes of pollution, and offer some strategies to return the lake to its original state as a BHS. Researchers conduct a research that analyses the pre- and post-monsoon seasons of the lake water characteristics. They comprise Prices are somewhat higher in the months before and after monsoon. Summer aeration of the lake and salt concentration may be to blame for this. Because it is unfit for consumption, the lake water may be utilised in agriculture. Garbage dumping, idol immersion, and the use of fertilisers and pesticides in the watershed region have all been cited as contributing to lake water pollution. Fish health has deteriorated owing to anoxia, and the water's appearance is unappealing because of the presence of nitrates, phosphates, and aquatic plant growth. The lake has been found to be deteriorated, which is causing eutrophication. Raking or skimming may be used to manage unwanted aquatic plant growth that is mostly water lettuce. Further, it is suggested that the issue may be rectified by ceasing rubbish dumping, idol immersion, and the use of fertilisers and pesticides.

SURESH KOMMU ET.AL (2019) Water is the most significant ingredient for regulating the climate and forming the land. One of the most significant substances that has an impact on human health and well-being is water. In the beginning, humans drank, cooked, and cleaned using water. Water's current usage, on the other hand, may be broken down into four broad categories: residential, public, commercial, and industrial (II). It's becoming more difficult to maintain a healthy aquatic environment due to the rapid expansion in industry and population as well as the vast quantities of chemicals, fertilisers, and pesticides used in agricultural production that are being used. Humans are at risk of contracting water-borne illnesses as a result of their usage of contaminated water. It is essential and obligatory to do frequent water pollution checks. Pollutants and hazardous metals may be present in the water, posing a danger to human health.

PREM SUDHA ET.AL (2018) Perennial rivers and subterranean water provide the Indian subcontinent with enormous water resources. Natural sources like lakes, ponds, rivers, and streams are contaminated to a lower level than artificial sources like urbanisation, industrialization, and different human development activities, but they are extremely polluted. Every American has a responsibility and an obligation to conserve the country's most important natural resources, including the environment. Saroornagarlake, a reservoir near Hyderabad, Telangana, has been selected as a water quality test site. In the three months from January to March of this year, water samples were taken at four different sites near Saroornagarlake. Among the many physical and chemical factors considered in the study were: temperature, pH, total solids, total dissolved solids, alkalinity, total hardness, calcium hardness, magnesium and chlorides as well as dissolved oxygen (DO), biological oxygen demand (BOD) and chemical oxygen demand (CO) (COD). This study's findings were then compared to industry standards for water quality, such BIS 10500. (1991). Alkalinity, carbonates and COD were found to be within the acceptable level, while all other metrics were found to be over it.

DR ARVIND PRASAD DWIVEDI (2017) At several sites in Chitrakoot District, samples of river mandakini were analysed to determine their physical and chemical properties. It was found that physical and chemical characteristics including pH, alkalinity TDS, Chloride, Total Hardness, Sulphate, and Phosphate were present in the water sampled. At latitude 24° 52'N and longitude 80° 41'E, Madhya Pradesh's river mandakini rises near hamlet Kalhura in the majhgawan block of district Satna. The findings were matched to WHO criteria (1984). All samples were determined to be within the World Health Organization (WHO) guidelines for temperature, pH, Chloride, Sulphate, and phosphate levels. According to this study, the river's water is not significantly contaminated, but there is an indication that pollution is growing as a result of human activity. Anthropogenic pollution can only be prevented by careful monitoring.

METHODS

The confluence of the Manjira and Godavari rivers is where the dam is situated in Telangana's Nizamabad district. With its location on a major river, this irrigation project serves the requirements of four districts in the southern Indian state of Telangana. It also serves as a water supply for the city of Warangal. In order to gather water and algal samples, three locations were chosen. For the duration of two years, polythene cans

were used to collect water samples from the dam's surface. It was necessary to carry the samples to the lab in an ice-box. Upon their return to the lab, the samples were subjected to conventional testing techniques to determine their carbonates, bicarbonates, chlorides, oxygen concentrations, organic matter, and overall hardness (APHA, 2005). In the field, pH and temperature were recorded. The sedimentation column was filled with one litre of surface water collected from various locations around the dam, and 2-3ml of 4% formaldehyde solution was added. Different kinds of algae were measured at each station using the drop technique outlined by Venkateswarlu and Pearsall.

The three primary seasons were followed by sampling from four different places six times a year. It's hot (May-June) and rainy (August-September) and winter (November-February) in India (Nov-Dec).

RESULT

Table 1 shows the varying physico-chemical properties of Pochampad dam. The quality parameter pH has a significant impact on biological life's survival and sustenance. All of the sites were found to have a pH over 8 during this examination, indicating that the water is alkaline.

An average concentration of 38.59 mg/L was found for carbonates, whereas the bicarbonate concentrations varied from 218.24 to 278.58 mg/L. At 141.44 mg/L, chlorides were the highest in the water. There was always more than 8.5 mg/L of dissolved oxygen available. 1.62 mg/L was the highest level of organic matter in the water. The concentrations of silicates measured ranged from 1.60 to 3.80 mg/L. Only 0.70-2.80 mg/L nitrates and 0.02-0.06 mg/L nitrites were discovered in the water, respectively. Throughout the examination, phosphates were documented as traces. The total hardness of the water varied from 118.00 to 246.00 mg/liter. Magnesium and calcium concentrations ranged from 14.74 to 38.62 mg/L. Sulphate concentrations varied from 20.00 to 36.00mg/L.

There were correlations among the physicochemical variables. Carbonates and pH are intimately linked, while bicarbonates are inversely connected to each other. The concentration of dissolved oxygen is inversely proportional to the amount of organic matter in the solution and the temperature of the water. Similarly, Singh, et al. (2017) and Pejaver and Gurav, (2017) found the same findings (2008). Due to calcium and magnesium bicarbonates, water seems to be hard. Water in the dam is well-oxygenated. Dissolved oxygen was consistently greater than organic matter over the course of the study and was never lower than 8.0 mg/L at any point. A direct correlation between dissolved oxygen and nitrate concentrations has been found.

According to WHO (2012), ISI and Rawals standards, the average values of the most significant physico-chemical variables of the dam examined are shown in Table 1. Because all of the variables are within acceptable tolerances, the water in Pochampad Dam may be considered "least polluted" by comparison.

Table 1: Comparison of the present data with ISI, WHO and RAWAL'S standards [All the parameters are expressed in mg/L except pH and Temperature (0C)]

S.No	Physico-Chemical Factors	Station -I	Station- II	Station- III	ISI 2012	WHO 2004	Rawals data 1978	
							Permissible Limit	Excessive Limit
1	Tem	23.40	24.410	23.20				
2	pH	8.4	8.37	8.5	6.5-8.5	7.0-8.5	6.5-8.5	6.5-8.9
3	CO ₃ ²⁻	31.38	29.26	38.59				
4	HCO ₃ ⁻	255.8	251.52	244.71				
5	Cl ⁻	135.57	141.44	140.06	-	200	250	600
6	DO	8.78	9.57	10.03	6	3	3	-
7	BOD	4.9	3.33	3.37				
8	OM	1.3	1.62	1.24				
9	COD	29.7	24.79	24.16				
10	TH	158.7	209.12	168.25	300	100	150	500

11	Ca ²⁺	54.86	44.08	43.19	200	75	75	200
12	Mg ²⁺	25.32	24.36	31.14	100	30.15	50	150
13	SO ₄ ²⁻	26.47	27.08	28.33				
14	PO ₄ ³⁻	0.05	0.05	0.06	-	-	2	5
15	SiO ₂	3.34	3.01	2.97				
16	NO ₃ ⁻	2.2	1.47	1.45	20	10	10	-
17	NO ₂ ⁻	0.02	0.03	0.03				

MPCB Report- MPCB observed parameters like pH, DO, BOD, Feacal coliform, total coliform, ammonia, and nitrate. According to their report they calculated water quality index by using National Sanitation Foundation Method. In that report they used modified CPCB weights for calculation of WQI of Manjra River. They choose two station one is Bhatkheda dist Latur having station id 2673 and other is Manjra River at Dhanegaon having station id 2157.

Table 2: Summary of parameters Studied on Manjra River by Maharashtra Pollution Control Board (MPCB)

Sr. no	Parameters	MPCB Report (2007-2008)	MPCB Report (2009-11)	MPCB Report (2011-12)	MPCB Report (2014-2015)
1	pH	✓	✓	✓	✓
2	DO	✓	✓	✓	✓
3	BOD	✓	✓	✓	✓
4	TDS	✓	✓	-	-
5	Feacal coliform	-	✓	✓	✓
6	Total Coliform	-	✓	-	-
7	Ammonia	✓	✓	-	-
8	Nitrate	✓	✓	-	-

Table 3: Summary of parameters Studied on Manjara River at different location by various Authors

Sr. no.	Parameters	Authors				
		Akuskar, S.K. & Gaikwad, A.V. (2006)	S. Hussain, V. Mane, T. Surendra, and M. Farooqui (2012)	P. C. Mane, D. D. Kadam, R.D.Chaudhari, and A. B. Bhosle (2013)	N. M. Sahajrao and R. G. Pawale (2015)	V. V. Naiknaware and S. Abed (2015)
1	pH	✓	✓	✓	✓	✓
2	DO	✓	✓	-	-	-
3	BOD	✓	-	-	-	-
4	TDS	✓	✓	-	-	-
5	Chloride	✓	✓	-	-	✓
6	Turbidity	✓	✓	-	-	-
7	Total Hardness	✓	✓	-	-	✓
8	Total Alkalinity	✓	-	-	-	✓
9	EC	✓	✓	-	-	-
10	Total Solids	-	-	-	-	✓
11	Calcium	-	✓	-	-	-
12	COD	✓	-	-	-	-
13	Magnesium	-	✓	-	-	-
14	Iron	-	-	-	✓	-
15	Fluoride	-	-	-	-	✓
16	Zinc	-	-	-	✓	-
17	Manganese	-	-	-	✓	-
18	Copper	-	-	✓	✓	-
19	Temperature	-	-	-	✓	✓
20	TDS	-	✓	-	-	-
21	Chromium	-	-	✓	-	-

CONCLUSION

Water quality in the dam is assessed using a combination of physico-chemical and biological criteria. Algal data has been a significant tool in lake research when it comes to biological factors. WQI's assessment was based on elements with a high weightage factor. The time series forecasting model's accuracy was limited by the low values found in the historical data. However, precautionary precautions must be made to safeguard the safety of the Manjira river River and to preserve this unique resource for future generations to enjoy. The Water Quality Index (WQI) may be used to communicate water quality information to the public and policymakers in an easy-to-understand manner.

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