The Physico-Chemical Characteristics of Selected Water Bodies Manjira River

Kamlesh Kumar Patel[1], Dr. Saurabh Mishra[2]

[1]Research Scholar, Sunrise University, Alwar, Rajasthan
[2]Assistant Professor, Sunrise University, Alwar, Rajasthan

Abstract

The maintenance of both human and aquatic life depends on water's high quality. River water quality is influenced by a wide range of environmental, climatic, seasonal, and land use factors, as well as by both natural and anthropogenic sources of pollution. Several water quality parameters, including physico-chemical parameters, biological parameters, and hydro-logical parameters, are typically monitored along rivers at varying times and throughout the year to account for the rise in water use for varying consumption and the discharge of pollution into rivers. Manjra is one tributary of Godavari River which runs through several regions of Maharashtra, Karnataka, Telangana and Andhra Pradesh. For the purpose of this paper, we will be reviewing the many studies that have been conducted on the Manjra River in regards to its water quality criteria.

Keywords: Manjira River**,** Pollution, Water quality.

1. INTRODUCTION

While all forms of life need water to function, growing populations can put pressure on supplies. The quality of freshwater is a worldwide issue of paramount importance because of its importance to human health. The quality of their surface water is a pressing concern for many nations. Water found in its natural environment is never 100% pure but rather a complex combination of dissolved inorganic and organic compounds and suspended particles. The amount and quality of accessible water resources are becoming more problematic as a result of fast economic expansion and urbanization. The chemical, physical, and biological characteristics of water are what establish its quality. Rivers are an important supply of water for many purposes, including agriculture, drinking, and industry. Physical, chemical, and biological water quality indicators are often necessary for evaluating both surface water and groundwater. The state of Maharashtra is the third biggest in India in terms of land area and has the second highest population. Mumbai serves as the capital city of the state of Maharashtra, which consists of 36 individual districts. Among the various rivers that flow through Maharashtra are the Godavari, Krishna, Tapi-Purna, Bhima, Wardha Wainganga, etc. Water is a chemical that has a significant impact on all forms of life. It is often believed that the first cells that would eventually become living organisms sprung from the placid depths of the primordial waters.

2. LITERATURE REVIEW

M. L. Thumram et.al (2021) Determining the quality of water requires research into its physicochemical qualities. The aim of the current investigation was to evaluate the quality of a freshwater body by analyzing its physicochemical properties. If you want to put water to varied uses, you need to analyze its physicochemical properties. The physical, chemical, and biological properties of water are often used to characterize its quality. The research was conducted over the course of a year, from June of 2016 to May of 2017. The current investigation measured and analyzed a total of 13 factors: ambient temperature, water temperature, pH, turbidity, alkalinity, calcium, chloride, nitrate, sodium, dissolved oxygen, biological oxygen demand, chemical oxygen demand, and total dissolved solids. In this case, all of the readings were within acceptable ranges. The population size, diversity, stability, productivity, and physiology of aquatic organisms are all influenced by the characteristics of the bodies of water in which they live.

Dina Nath Pandit et.al (2020) Research was conducted between January 2018 and December 2019 to assess the ecology and diversity of the zooplankton in the Ganga River near Arrah in Bihar, India. Biodiversity was measured by looking at how different physical and chemical factors affected the zooplankton. Total alkalinity, hardness, chloride, nitrate, and sulfate were positively related to water temperature, whereas pH and dissolved oxygen were negatively related. There were 23 different zooplankton families found, ranging in density from 2

to 213 ind./L. This included 6 different Rotifera families, 5 different Protozoa families, 5 different Cladocera families, 4 different Copepoda families, and 3 different Ostracoda families. The investigation revealed that the varied environmental and inflow features of the water body caused the density of zooplankton to decrease after the monsoon and stay highest in the summer. There was a positive relationship between zooplankton density and total alkalinity, hardness, and chloride levels, but a negative relationship with temperature, pH, and dissolved oxygen levels. Water quality in connection to zooplankton and the river's limnological profile were evaluated using the Shannon-Weiner index, the Margalef richness index, the Pielou's evenness index, the Menhninick's index, and the Simpson index. Moderate to high zooplankton diversity and moderate river pollution were indicated by the diversity indices.

Kamlesh Meena et.al (2019) Microscopic phytoplankton live in water where they produce their own food through photosynthesis. Phytoplankton form the foundation of the food chain as primary producers. The phytoplankton were being impacted by a wide variety of physico-chemical factors. This publication aims to provide a comprehensive overview of previous research on phytoplankton. This analysis provides strong evidence that such studies are required and highlights the pressing need for ongoing research in this area. Given the current state of affairs, it is crucial to do new research in this area to determine the variety, abundance, and variance of biotic variables in the aquatic system.

A.C. Kumbhar et.al (2017) One of the artificial water bodies in the vicinity of Solapur city in North Solapur Tahasil is the Ekrukh water reservoir. Built during the time of the British Empire. It can hold 3,330 million cubic feet of stuff altogether. An astounding 17,152 acres of land are under this reservoir's control. Presently, irrigation and drinking are the two most common uses for water from the Ekrukh water tank. A wide variety of local and transient bird species call this body of water home. Over the course of a year, from May 2016 to April 2017, the physicochemical characteristics of the Ekrukh wetland are studied. Temperature, pH, total hardness, total alkalinity, and dissolved oxygen levels were measured in the Ekrukh water. All measurements were determined to be well within World Health Organization (WHO) recommended ranges. In other words, the tank is clean enough to be utilized for drinking water, irrigation, and pisciculture.

P.C.Mane et.al (2013) By transporting molecules across the layers and facilitating chemical reactions, water has a pivotal role in mediating ecosystem processes on a global scale, connecting the atmosphere, lithosphere, and biosphere. There is no such thing as "pure water" in nature; instead, liquids include a wide variety of dissolved and suspended organic and inorganic molecules and particles. Surface water was found to contain trace elements at lower concentrations than groundwater. This research was conducted to identify the trace elements in Manjara Dam. UV spectroscopy was used to calculate the total concentrations of chromium and copper. Three different sample locations, S1, S2, and S3, were analyzed for their content of certain trace elements. The research was conducted over a span of two years, from 2009–2010 to 2010–2011. It was found that chromium concentrations ranged from 0.018 to 0.0013 mg/L, while copper concentrations ranged from 0.035 to 0.0086 mg/L. Seasonal shifts were clearly visible over the whole research period, as seen by the observed values.

3. METHOD

The dam is located in the Nizamabad district of Telangana, near the meeting point of the Manjira and Godavari rivers. Located on a major river, this irrigation project meets the needs of four districts in the southern Indian state of Telangana. It also acts as a water source for the city of Warangal. We selected three sites to collect water and algae samples. To test the quality of the dam's water over a two-year period, we periodically gathered samples in polythene cans and analyzed them for our findings. The samples had to be transported in a cool box to the research facility. When the samples were brought back to the lab, the usual tests were performed to find out the levels of carbonates, bicarbonates, chlorides, oxygen, organic matter, and hardness (APHA, 2005). Field measurements included pH and temperature. One liter of surface water was collected from different areas surrounding the dam and placed in the sedimentation column, along with 2-3 ml of a formaldehyde solution at a concentration of 4%. Drop approach as described by Venkatachalam and Pearsall was used to quantify various types of algae at each station.

The three main seasons were followed by sampling from four separate areas six times a year. India has three distinct seasons: summer (May–June), monsoon (August–September), and winter (November–February) (Nov-Dec).

4. RESULT

The MPCB report included measurements of factors such as pH, dissolved oxygen, biological oxygen demand, fecal coliform, total coliform, ammonia, and nitrate. Their study states that they used the National Sanitation Foundation's approach to determine the water quality index. The Manjra River Water Quality Index was calculated in that study using revised CPCB weights. They picked two stations: one with ID 2673 and another with ID 2157 (Manjra in Dhanegaon).

Table 1: 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 2 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	-	-	✓	-	-

5. CONCLUSION

The physicochemical and biological characteristics of the water are considered together while evaluating the dam's water quality. When studying the biological components of lakes, algal data has shown to be invaluable. The WQI rating was determined by a combination of factors. The low values in the historical data hampered the performance of the time series forecasting model. Precautions must be taken, however, to ensure the continued

health of the Manjira River and ensure that future generations may benefit from its unique resources. By using the Water Quality Index (WQI), data on water quality may be conveyed to the general public and policymakers in a straightforward manner.

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