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Assessment and Critical Analysis of River Water in Maharashtra

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ABSTRACT

Water is the most valuable resource on Earth since it is essential to life and the preservation of a livable ecosystem. According to estimates, just 3% of the world's water supply is fresh, while the remaining 97% is ocean. Even though it only has 4% of the world's water, India supports 18% of the global population. In contrast, Maharashtra is home to five river basins, all of which are fed by rain. Humans pollute water sources via a wide variety of practises. These actions cause a decline in water quality, which is bad for aquatic life in general. In this context, "quality of water" refers to the physical, biological, and chemical properties of the liquid. So, it's crucial to create an index to evaluate river water quality. Methods for determining water quality in diverse places were described in this research.

KEYWORDS: *Water quality index (WQI), WQImin, CWMI, Maharashtra*

INTRODUCTION

Water, a necessary component of life, may be found in abundance all across the planet. This once-vast natural resource is now mostly exhausted and used for a precious resource that is being used more intensively to meet the demands of a growing population [1]. The provision and upkeep of clean and fit for drinking water is now the world's most urgent and top rank concern due to the worldwide water crisis.

Droughts and other climate-related events have put a strain on local water supplies [9]. Improvements have been made in the gloomy struggle against severe water shortages. There is an immediate need to determine the origins of water-related problems and provide solutions in order to map out a strategy for the protection of drinkable water and other water-related infrastructure in the future [3]. To keep a marine ecosystem thriving, it need a balance between the water's physicochemical makeup and the abundance of aquatic life. Dams have been built throughout India to collect water from several rivers and streams for use in agriculture, industry, fisheries, energy production, and municipal water systems**.** The availability of clean water and effective waste management are critical to societal well-being. You can't just make more water as you can with other things; it's a finite resource. Nature has bestowed this to all creatures for their survival. Nearly three-quarters of Earth is covered by water, as is common knowledge. However, the seas and oceans provide around 97.3 percent of the world's freshwater resources. The world's population is growing quickly, but the availability of clean water is not keeping pace. Nearly 97% of all water on Earth is salt water, whereas just 3% is fresh water. Water sources include of 75% polar ice and glaciers, 10% ground water accessible below 800m deep, 13% ground water available between 800m to 4000m depth, and 2% from other sources. India has 18% of the world's population yet just 4% of the world's freshwater. In any case, the nation is now experiencing the worst water crisis in its history, putting many lives in jeopardy. Millions of Indians already have serious water problems, and roughly tens of thousands of people lose their lives each year because of inadequate access to clean water. That's why it's crucial that we learn more about water systems so we can utilise them efficiently and sustainably. The CWMI was set up by the NITI Aayog to provide state governments in India permission to implement dynamic water management. [7]

There are roughly 1821 significant dams across the state of Maharashtra's five river basins, with the

majority located on the rivers Krishna, Godavari, Narmada, and Tapi. About 45 percent of Maharashtra's water comes from rivers that only flow during the monsoon months, beginning in the Western Ghats and draining into the Arabian Sea. Since the average elevation of the Western Ghats is 600 metres above sea level, only a fraction of this water is really put to use. There are now around 11,000 rural water supply systems, 389 urban water supply schemes, and 26 urban sewerage projects in operation in the state.

Water Quality Index

The quality of water refers to the physical, chemical and biological characteristics of water. The sufficient amount of appropriate quality water assets provides a prerequisite for commercial and environmental development. This is most important for human need, agriculture, and industrial requirement as well as for biotic species purpose. But the abundant anxieties influence quality of water such as industrial activities, pesticides in agriculture, urbanization and natural processes like soil erosion. Due to this water quality becomes a serious issue worldwide. So the quality of water is generally achieved through treatment on the water by considering set of parameters. The most common criteria's are related to drinking water, human health and the environment. The World Health organization (WHO) sets the guidelines for the water quality parameters.[6]

In Maharashtra, the water quality testing is monitored by state nodal agency Maharashtra Pollution Control Board (MPCB). Monitoring is carried out at 294 stations which include 176 rivers, 36 sea creek, 66 ground-water and 12 nallahs. MPCB has infrastructure to monitor 44 parameters including field observations, general parameters, core parameters and trace metals. The water samples are monitored with a monthly and six monthly frequencies for surface and ground water stations respectively. The water quality status of Maharashtra, Formula and classification of water quality indices and annual average WQI is as follows

Table -1: Formula and classification of Water Quality Indicesfor Surface and Ground water

Surface Water Quality		Ground Water Quality	
$WQI=\sum_{i=1}^{P} Wi\ Ii$		$WQI=\sum_{i=1}^{n=9} qi \cdot wi$	
Where, Ii = sub index for waterquality parameter Wi = weight (in terms of importance) associated with waterquality parameter P = number of water quality parameters		Where, qi = quality rating wi = relative of each weight	
WQI	Quality classification	Remarks	Color code
Surface Water Quality			
63 – 100	Good to Excellent	Non Polluted	
50 – 63	Medium to Good	Non Polluted	
38 – 50	Bad	Polluted	
38 and less	Bad to Very Bad	Heavily Polluted	
Ground Water Quality			
< 50	Excellent	Non Polluted	
50 – 100	Good Water	Non Polluted	
100 – 200	Poor Water	Polluted	
200 – 300	Very Very Poor	Polluted	
> 300	Water Unsuitable for drinking	Heavily Polluted	

Source: Water Quality Status of Maharashtra 2017-18, by MPCB, January 2019.

Fig -1: Water Quality Status of Maharashtra *Source: Water Quality Status of Maharashtra 2017-18.*

WATER QUALITY INDICES IN DIFFERENT GLOBAL REGIONS

Wei Sun, Dongjiang River, Correlation Analysis WQImin.[1] Using a modified version of the WQI that he calls WQImin, he streamlines the process of making spatial and temporal adjustments to the index. It relies on PCA and correlation studies of water quality indicators. The end result is identical to the one obtained with the preceding index. Similarly, WQImin may simulate the cyclical variations in water quality. Additionally, they advocate for continuous nursing to protect against industrial contamination. In addition, the methods and outcomes presented here serve as a reference point for future monitoring of the Dongjiang River. They also suggested that, for effective management in the area around the Dongjiang River, water pollution foresight strategies be used continuously.

Devendra Swaroop Bhargava, Ganga River, Weighted Arithmetic Average.[2] This research aims to evaluate the Water Quality Index (WQI) for the purpose of categorising and zoning the Ganga River. He simplified the model for WQI by taking into account all the positive uses of the Ganga River and the values of variables in the sensitivity function with their respective weights. In addition, he determined total WQI scores using a persuasive weighted arithmetic average. As a consequence, during the summer, when water use is at its peak, parts of the Ganga River have water quality that does not even meet the standards for class III. He suggests raising awareness about water contamination as a means of preserving rivers at their current excellent quality.

Gurdeep Singh, Mining Talukas of Goa, Physico-chemical Parameters.[3] The primary goal of the research is to determine the best method of therapy for the urgent problems facing the mining talukas in Goa, India. By measuring a wide range of physicochemical characteristics, they determined the standard of surface water in several Goan mining districts. The results showed that the WQI was greatest during the monsoon seasons and lowest after the monsoons..

Ramotra K. C., Warana River Basin, Influence of Spatiotemporal Changes.[8] Their research aims to quantify the impact of regional social developments on economic growth. The information is gathered via fieldwork in rural areas close to the sugar mill. They discovered that those who live in close proximity to such complexes tend to have higher standards of life than those who do not. The research suggests that their level of life might be improved by developing irrigation infrastructure and using innovative agricultural practises.

NITI Aayog, Composite Water Management Index: A tool for Water Management.[7] Information on how to improve CWMI in Indian states is provided in this study. These recommendations serve as a useful resource for policymakers as they formulate new measures. This report's statistics are publicly available, therefore it may serve as a roadmap for actual planning.

DISCUSSION

There are several ways to calculate the WQI of both surface and ground water. WQI is adjusted for

location and time of year. It may be determined using the weighted arithmetic average approach, by assessing physico-chemical parameters, by using correlation evaluation of water parameters to minimise WQI to get WQImin, by taking into account spatial and temporal shifts in river biodiversity, and so on.

NITI Aayog produced recommendations for WQI of a variety of Indian states after thinking about various ways and the geographical geography of India. The varied topography of India necessitates that we tailor our analysis to the specifics of each state. NITI Aayog provides the formula for determining WQI in Maharashtra.

CONCLUSIONS

To evaluate the standard of water in rivers and aquifers, an index has been developed called the Water Quality Index. Each year, the Maharashtra Pollution Control Board (MPCB) in India releases a report detailing the state of the state's water supply. WQI values during the year may be assessed with the use of this information and the NITI Aayog's recommendations. In addition, we can use it to create the Composite Flood Mitigation Index (CWMI) for a specific river basin, which will help us better manage river water and ensure that it is of high quality.

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